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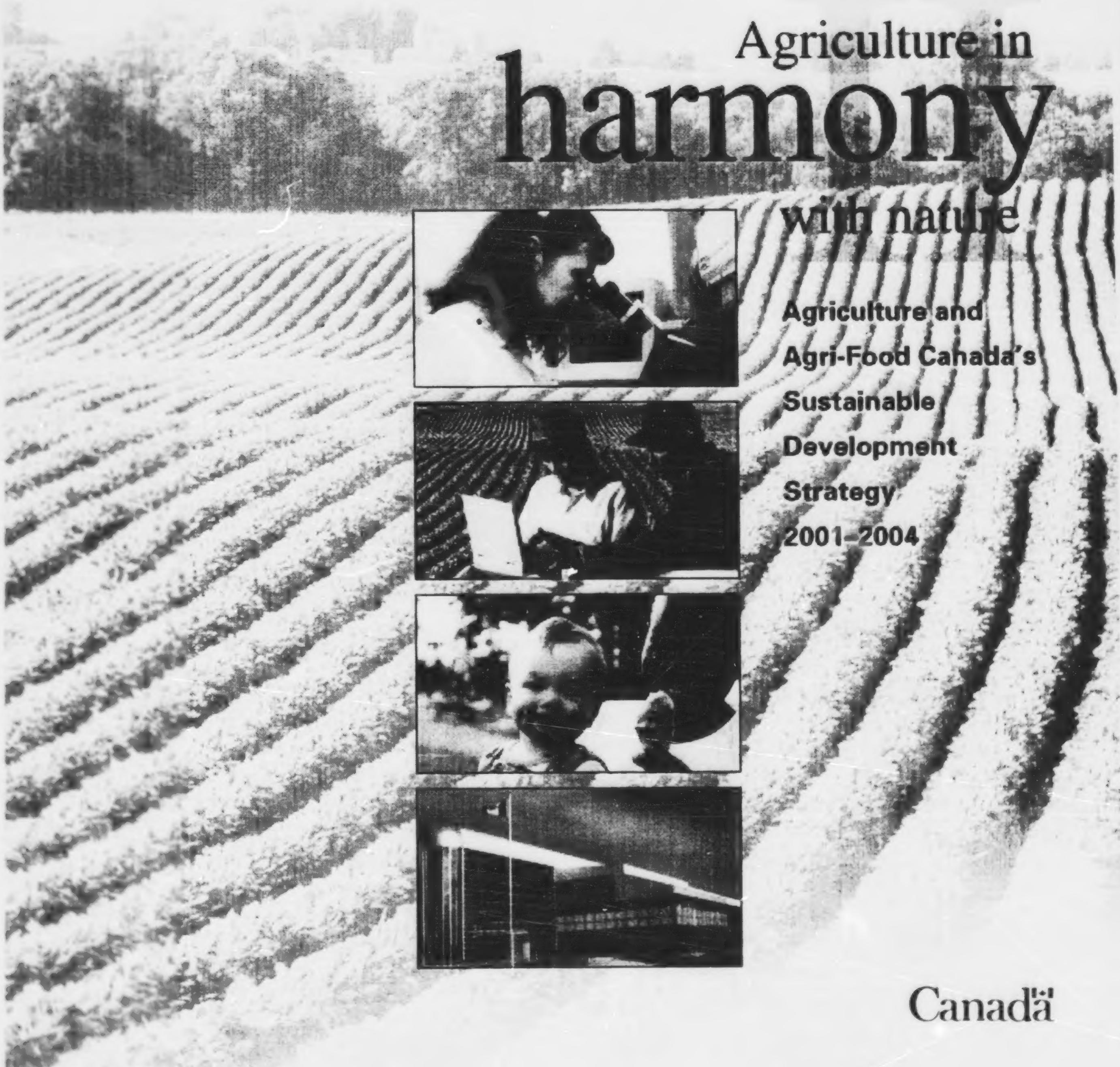

Agriculture in harmony with nature

Agriculture and Agri-Food Canada's Sustainable Development Strategy 2001–2004

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This document embodies the opportunities presented by the life science economy by the use of non-traditional, renewable agriculture products. The cover and text were printed on paper made from hemp, and vegetable-based inks were used in the printing process.

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Agriculture in harmony with nature II

Agriculture and Agri-Food Canada's Sustainable Development Strategy 2001–2004

From the
Minister

Canadians are increasingly aware of the impact agricultural practices can have on environmental and human health. Together with the sector, we are taking action to address these issues and to take advantage of practices that have multiple benefits. For example, adopting farming practices that reduce greenhouse gas emissions associated with climate change often improves other aspects of sustainable agriculture, such as biodiversity, energy efficiency, and water quality. We are also working with communities to provide them with the information they need to plan for the future and adapt to change.

Change will continue to be a big part of agriculture in this millennium. Changes are occurring in production practices as a result of increased demand, globalization, international market pressures, and technological innovations. The new life science economy, with its shift from conventional natural resources to renewable agricultural products, is creating a whole new range of products and services. The expansion of traditional markets will contribute to the economic sustainability of the agricultural sector and to Canada's prosperity.

As we strive for more viable, environmentally sustainable practices for the sector, we must also lead by example. It is imperative that our own decision-making processes and operations incorporate the principles of sustainable development and, at the same time, demonstrate good practices to Canadians.

It is clear that the environmental challenges of today are many and complex. To help the sector meet these challenges, Agriculture and Agri-Food Canada will continue to support environmental programming.

Our second sustainable development strategy, *Agriculture in Harmony with Nature II*, builds on the goals and accomplishments of our first strategy, and provides the framework that will guide departmental efforts over the coming years towards environmental, economic, and social sustainability. I am confident that, by working cooperatively with industry and other stakeholders, we will contribute to improving the quality of life of all Canadians, including those of future generations.

Lyle Vanclief

Executive Summary

Sustainable development is a blending of environmental, social, and economic opportunities that strives to meet the needs of the present without compromising the ability of future generations to meet their own needs. The federal government is committed to this vision, asking that each of its departments follow a sustainable development strategy geared specifically to its mandate and integrated into its day-to-day and long-term decision-making processes.

Sustainable agriculture

Sustainable development in the agriculture and agri-food sector, or *sustainable agriculture*, is the goal towards which we are striving. It is a way of producing and processing agricultural products that can be carried out over the long term, in a manner that supports or enhances the high quality of life we enjoy in Canada today. Sustainable agriculture protects the natural resource base, prevents the degradation of soil, water, and air quality, and conserves biodiversity; contributes to the economic and social well-being of all Canadians; ensures a safe and high-quality supply of agricultural products; and safeguards the livelihood and well-being of agricultural and agri-food workers and their families.

Agriculture and Agri-Food Canada (AAFC) can play a number of roles in working with its partners in government, industry, and communities towards sustainable agriculture. For example, investing in scientific understanding and innovation to develop environmentally sound products, practices, and technologies, and encouraging the adoption of these innovations by the sector through adaptation and stewardship initiatives continues to be a key component of this second sustainable development strategy. AAFC also has the analytical and modeling capacity to link short- and long-term environmental effects with economic parameters to better predict the impacts of our policies and programs. Complementing this is our ability to determine and monitor the state of the agricultural environment through environmental performance indicators.

Our new strategy for sustainable development

AAFC will work with partners and stakeholders to contribute to a better quality of life for all Canadians. Efforts will be targeted at improving the environmental sustainability of natural resources, promoting a prosperous and viable sector where growth is achieved in an environmentally sustainable manner, and contributing to sustainable communities. In addition, AAFC will lead by example, integrating sustainable development into its own departmental decision-making process, as well as greening its own operations.

Two fundamental components form the basis of AAFC's approach to sustainable development. First, the department will work with partners to foster a broader approach to risk management by developing a framework that better links income-support programming with food safety and environmental objectives. Second, it will implement a sectoral growth strategy built on science, innovation, and knowledge, and on the development of new products and services that are more environmentally sustainable.

Organized into four strategic directions, or themes, *Agriculture in Harmony with Nature II* outlines a series of objectives that represent AAFC's sustainable development priorities for the coming years. It also outlines clear, measurable, and time-bound performance targets, each linked to one or more performance measures. Careful monitoring will ensure that the department identifies any corrective actions needed to keep the strategy on track and makes any necessary adjustments to the objectives and targets.

This strategy is built on the results of several departmental assessments of agriculture and the environment, published in detailed reports on the health of our soils, air, and water; the departmental agri-environmental indicator project; and prairie agricultural landscapes. Development of the strategy was assisted by consultations with industry groups, other interest groups, and government partners, and was underpinned by an issue scan that identified social, economic, and environmental factors affecting the department and the sector, now and in the future.

Strategic Direction 1

Environmental sustainability of our natural resources

At every point of production, agriculture has the potential to affect the environment. The environmental risks associated with agriculture can be reduced by sound decision-making at all levels of responsibility. Important steps have already been taken by the sector to adopt agricultural practices that balance production needs with the conservation of natural resources (soil, water, and air) and biodiversity. However, there is still room for improvement.

Agriculture and Agri-Food Canada will work with the sector and with other stakeholders to enhance the sector's capacity to manage soil resources; improve public access to good quality, secure water supplies; mitigate impacts on air and on the ozone layer, and adapt to climate change; and to support the adoption of practices that conserve or enhance soil and water quality. AAFC will conduct research and development activities to develop innovative technologies and management practices, and to increase our understanding of factors affecting the natural resources. AAFC will also evaluate policy options and engage in education and awareness activities to promote the adoption of these practices and demonstrate their effectiveness and importance to the sector.

Agriculture depends on a healthy diversity of the organisms and ecosystems that are its foundation. Because of this close relationship, natural-resource-based industries such as agriculture have a direct impact on biodiversity. AAFC will work with the sector and with stakeholders to increase the knowledge and understanding of the agricultural biodiversity (the diversity of plants and animals domesticated for agricultural use) and natural biodiversity within agro-ecosystems, and to demonstrate the importance of conserving this biodiversity. AAFC will provide leadership in strengthening Canada's biodiversity science and networking capacity, and in increasing understanding and awareness to improve the conservation of biodiversity and the sustainable use of the earth's living organisms. AAFC's new biodiversity strategy is incorporated entirely within this strategy.

Strategic Direction 2

Prosperous and viable sector in a sustainable manner

High-quality food products and a commitment to environmental protection have contributed to the successful marketing of Canadian agri-food products in both domestic and export markets. The sector could capitalize further on this opportunity and contribute to achieving economic sustainability by differentiating and commercializing Canadian products on the basis of environmentally sustainable production, and by marketing technologies and expertise with demonstrated environmental benefits. Today's life science economy offers the potential for economic as well as environmental benefits to the sector and to society through the innovative use of products and by-products from agriculture and food processing. At the same time, pursuing eco-efficiency in the agriculture and agri-food sector may further enhance the sector's capacity to increase productivity and reduce costs, while contributing to good environmental performance.

Agriculture and Agri-Food Canada, in partnership with other departments, the agriculture and agri-food sector, and other stakeholders, will work to increase the understanding and awareness of eco-efficiency and to encourage the development and adoption by the sector of eco-efficiency management tools, technologies, and practices. AAFC will assist in achieving a favourable business climate by integrating sustainable development principles into its investment strategy. It will also work to find the right place in the market for products, technologies, and knowledge that contribute to a sustainable agriculture through the development of information, the communication of opportunities to investors, and the promotion of the life science economy.

Strategic Direction 3

Contribution to sustainable communities

Community-level issues, such as concerns over intensive agricultural production and competing land use, need to be addressed. To support sustainable communities, information is needed to enable decision-makers to plan for the future and ensure that the physical environment can meet the changing needs of the sector. It is a departmental priority to provide information on agri-environmental issues, so that Canadians have the knowledge to make sound decisions. Another concern is to maintain a high level of consumer confidence in the quality, safety, and production of Canadian food.

Agriculture and Agri-Food Canada will work with the sector and other stakeholders to reduce the risk associated with pest management through research and development, and education and awareness activities that promote integrated pest management and best practices. AAFC will also evaluate policy options that could facilitate the introduction of reduced-risk pest-control products. It will work with the sector and other stakeholders to provide information and knowledge for informed land-management decision-making. AAFC will communicate with Canadians to identify and address concerns related to agricultural production and to provide information on the sector's progress towards sustainable agriculture. It will also work with partners and stakeholders to position Canada as a world leader in the research, production, and marketing of a wide range of products with potential benefits for health (e.g., functional foods and nutraceuticals).

Strategic Direction 4

Sustainable development integrated into departmental policies, programs, and operations

Organizations of all kinds are becoming more concerned about how to control the impact of their activities, products, and services on the environment. As the single largest organization in Canada, the federal government can set an excellent example for Canadians to move towards sustainable development. As a part of the federal government, AAFC has a role to play.

AAFC will integrate sustainable development principles into its policies and programs by educating its policy analysts and senior management about sustainable development and by reviewing departmental policies, programs, and legislation from the perspective of sustainable development. It will also green its operations by adopting green procurement practices; improving the management of waste, water, and waste-water; improving energy efficiency; and adopting best practices for managing lands and vehicles.

Monitoring for continuous improvement

During the drafting of this second sustainable development strategy, AAFC's business lines were realigned to include "Health of the Environment" as one of three lines. This change elevates the importance of environmental issues within the department and the sector, while strenghtening the implementation of the strategy and the integration of sustainable development into departmental decision-making. Furthermore, this realignment ensures that AAFC's performance in achieving a healthy environment is reported on annually through the Departmental Performance Report and the Departmental Report on Plans and Priorities.

Contents

From the Minister of Agriculture and Agri-Food Canada ii

Executive Summary iii

Introduction 1

Issue Scan 3

Our New Strategy for Sustainable Development 10

Strategic Direction 1 — Environmental Sustainability of Our Natural Resources 15

- A) Natural resources 15
    - Objective 1.1: Improve the health of our soils 15
    - Objective 1.2: Improve the health of our water 18
    - Objective 1.3: Improve the health of our air 20
- B) Biodiversity 22
    - Objective 1.4: Improve agricultural biodiversity 24
    - Objective 1.5: Improve the conservation of natural biodiversity 26

Strategic Direction 2 — Prosperous and Viable Sector in a Sustainable Manner 29

- Objective 2.1: Improve productivity through eco-efficiency 29
- Objective 2.2: Improve investment, market access, and market development for agriculture and agri-food products, technologies, and knowledge that contribute to sustainable agriculture 32

Strategic Direction 3 — Contribution to Sustainable Communities 35

- Objective 3.1: Reduce risk in pest management 36
- Objective 3.2: Encourage informed public dialogue on agri-environmental issues 39
- Objective 3.3: Develop healthy innovative products 41

Strategic Direction 4 — Sustainable Development Integrated into Departmental Policies, Programs, and Operations 43

A) Sustainable development in policies and programs 43

Objective 4.1: Integrate sustainable development principles into policy and program development 43

B) Greening departmental operations 45

Objective 4.2: Practise green procurement 46

Objective 4.3: Improve waste management 46

Objective 4.4: Improve water and wastewater management 47

Objective 4.5: Improve building management 48

Objective 4.6: Improve fleet management 49

Objective 4.7: Improve land management 50

Annex A — AAFC's First Sustainable Development Strategy 51

Annex B — Consultations 57

Annex C — Sectoral Performance Measures: Baseline Information 60

Annex D — Further Reading 64

Introduction

Sustainable development is a blending of environmental, social, and economic elements that strives to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. The key tool that federal departments use to identify their contribution to the federal government's overall vision for sustainable development is the sustainable development strategy. These strategies are geared specifically to departmental mandates, outlining how the departments will improve the integration of social, economic, and environmental considerations into their programs, policies, and operations. Amendments to the *Auditor General Act* in 1995 required each department to table the first of these strategies in 1997 and to update it every three years.

Environmental, social, and economic opportunities — all in one

Many farmers already apply environmentally sound management practices and reap their economic benefits. By using conservation tillage, for example, they have reduced soil erosion and increased the amount of carbon stored in the soil. In doing so, they have cut the production costs associated with running farm machinery, including that of fuel.

Some farmers have also planted shelterbelts to help prevent soil erosion. Shelterbelts create microclimates that offer unique cropping opportunities, provide wildlife habitat, and enhance the visual diversity of the rural landscape.

Sustainable agriculture and agri-food production

For development to be sustainable, environmental, social, and economic considerations must be integrated into day-to-day and long-term decision-making processes. In 1995, the World Bank defined the concept of sustainability in terms of the opportunity and the need to leave future generations with as many, if not more, opportunities than we enjoy now. These opportunities include improving the overall health of the environment and the quality of life of all citizens.

Sustainable development in the agriculture and agri-food sector, or *sustainable agriculture*, is a goal to strive for. It is not a specific system or practice, but rather a way of producing and processing agricultural products that can be carried on for generations, supporting the high quality of life we enjoy in Canada. Sustainable agriculture and agri-food production

- protect the natural resource base; prevent the degradation of soil, water, and air quality; and conserve biodiversity;
- contribute to the economic and social well-being of all Canadians;
- ensure a safe and high-quality supply of agricultural products; and
- safeguard the livelihood and well-being of agricultural and agri-food workers and their families.

Opportunities associated with sustainable agriculture

The agriculture and agri-food sector contributes significantly to the broader environmental, economic, and social systems in Canada and around the world. For Canadians to continue to benefit now and in the future, the department and the sector must harmonize the three components of sustainable development, rather than trade one off against the other. The most effective way to do this is through a balanced, holistic approach that is proactive, has a clear focus on tomorrow's opportunities, and emphasizes continuous improvement rather than a "react and cure" approach that aims largely at addressing yesterday's problems.

Responding to market demands to achieve economic gains can offer social and environmental benefits. Likewise, working to improve the environment can have desirable social and economic outcomes.

Our role in achieving sustainable agriculture

Agriculture and Agri-Food Canada (AAFC) has been in the business of sustainable agriculture since its inception, without necessarily calling it that. We fully recognize that a healthy environment, safe food and clean water, and strong economic returns are critical for the sector to continue to thrive and contribute to the well-being of Canadians.

We have a role to play in optimizing the sector's contribution to the quality of life of Canadians through sustainable agricultural and agri-food development. Specifically, the department sets the stage for the sector to be more sustainable through its programs, policies, and regulations; research and development activities; and education and awareness initiatives.

In developing this strategy, we have built on the results of extensive departmental assessments of agriculture and the environment, as reported in the following publications:

- *The Health of Our Soils;*
- *The Health of Our Air;*
- *The Health of Our Water;*
- *Environmental Sustainability of Canadian Agriculture: Report of the Agri-Environmental Indicator Project;* and
- *Prairie Agricultural Landscapes: A Land Resource Review.*

Many industry groups, government partners, and other interested stakeholders assisted us in developing the strategy through a consultation process described in Annex B. We also conducted an issue scan to identify trends that affect, or may affect, the sector, now and in the future. Both of these exercises helped to ensure that our priorities are correct and that our activities achieve meaningful results that contribute to the growth and prosperity of Canada.

Our mandate

Agriculture and Agri-Food Canada promotes the development, adaptation, and competitiveness of the agriculture and agri-food sector through policies and programs that are most appropriately provided by the federal government. The overall goal is to help the sector maximize its contribution to Canada's economic and environmental objectives, and achieve a safe, high-quality food supply while maintaining a strong foundation for the agriculture and agri-food sector and rural communities.

AAFC's Biodiversity Action Plan

Under the Canadian Biodiversity Strategy, Agriculture and Agri-Food Canada released its first Biodiversity Action Plan in 1998. This plan emphasized the importance of biodiversity to agriculture and described the many industry and departmental initiatives that benefit both agricultural biodiversity (plants and animals domesticated for agricultural use) and natural biodiversity (organisms in the wild). Our first sustainable development strategy also included a number of commitments that specifically addressed biodiversity, emphasizing the importance of biodiversity conservation as a component of achieving sustainable agriculture. As the next step in the evolution of the department's consideration of biodiversity, the new biodiversity strategy is incorporated entirely within our second sustainable development strategy.

Issue Scan

The agriculture industry contributes to, and is influenced by, complex economic, social, and environmental systems. The interactions among these systems must be taken into account when making decisions that will encourage sustainable agriculture and contribute to the health and prosperity of all Canadians.

Historically, sustainability in the agriculture sector has focused on enhancing the natural resource base upon which agriculture depends, particularly soil, water, and genetic resources for crops and livestock. In recent years, this focus has broadened to include both on- and off-farm considerations. On the farm, sustainability issues relate to intensified production, the use of new technologies and practices, and improved crop and animal traits, among other things. Agriculture's direct connection to the natural environment has invited public scrutiny and pressure to maintain or improve environmental quality, biodiversity, and wildlife habitat both on and off the farm.

Social pressures and opportunities

Canadian society continues to evolve, resulting in changing social preferences and perceptions of the relationship between agriculture and the environment. Ten years ago, loss of farmland to urban encroachment was cited as the most important agri-environmental issue. This concern remains, but public attention has shifted to the off-farm effects of agricultural practice, such as unpleasant odours, impaired water quality, and the environmental and human health effects of pesticide use.

> "The sector is under increasing pressure to produce products that meet the changing needs of consumers, both here and abroad. Shifts in demographics, concerns over health and food safety, and environmental issues are just a few of the forces creating the 'new consumer'."
>
> *1998–1999 AAFC Departmental Performance Report*

Farmers are also feeling the pressure to diversify and adapt to meet new consumer demands. Today's consumer has broader and more exotic tastes, greater spending power, and less time to shop and prepare meals, all of which influence their choice of agricultural products.

In recent years, both the agri-food sector and consumers have begun to look at food not only for the basic nutrition it provides, but also for its additional health benefits. Functional foods and nutraceuticals (*see* Box on page 4) provide physiological benefits or reduce the risk of chronic disease beyond their basic nutritional value. The market for these products is driven by many factors, including

- consumers' growing understanding of the link between diet and disease;
- aging populations;
- rising health-care costs; and
- advances in food technology and nutrition research.

This global market is growing quickly. The current market is estimated at up to $2 billion in Canada, $10–37 billion in the United States, $15–20 billion in Europe, and $10–14 billion in Japan. Investment, jobs, and growth, together with access to a variety of products with potential health benefits, all point to the promise of this industry.

Social snapshot

- One-third of all Canadians live in rural and remote communities.
- More than 98 percent of all farms in Canada are family owned and operated.
- On average, each of Canada's 280,000 farms annually produces enough food for 120 people.
- About 2 million Canadians combine their efforts to bring food to our tables.

Changes are also taking place in Canada's rural communities for reasons that include

- government downsizing and the centralization of essential services;
- the lack of local employment opportunities;
- migration of young people to cities;
- the introduction of technology; and
- urban encroachment, resulting in new residents bringing urban values to the rural setting.

Rural communities are usually characterized by a sense of home, history, and pride, and by a tradition of cooperation and civic involvement. Rural Canadians typically have a strong sense of the intrinsic value of land and the stewardship of natural resources, and place great importance on clean air and water.

Through the *Federal Framework for Action in Rural Canada*, the Government of Canada has defined its vision for rural Canada as one of vibrant communities and a sustainable resource base that contributes to our national identity and prosperity. The government is working to bring this vision for sustainable communities into reality through initiatives such as the first-ever National Rural Conference, held in April 2000. The conference, which brought together stakeholders from across the country, identified a number of challenges faced by rural residents in maintaining their quality of life, including

- competing land use;
- attracting new businesses and jobs;
- acquiring the necessary skills to adapt to changing technologies;
- maintaining infrastructure;
- recruiting medical professionals;
- increasing youth involvement in community development; and
- strengthening economic diversification in areas dependent on primary production.

The government is already taking action on these priorities and is in the process of identifying future actions, with input from rural Canadians.

Economic pressures and opportunities

Globalization, trade agreements, increased domestic and world demand, market pressures, and technological innovations have spurred increased productivity in Canadian agriculture. To achieve this growth, the agricultural sector is undergoing profound changes and making adjustments in production practices.

Functional foods and nutraceuticals

A functional food is similar in appearance to, or may be, a conventional food; is consumed as part of a normal diet; and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions.

A nutraceutical is a product isolated or purified from foods and generally sold in medicinal forms. A nutraceutical is demonstrated to have a physiological benefit or to provide protection against chronic disease.

The sector is working to increase its share of global agricultural trade, especially of processed products, by becoming more productive and competitive. The Canadian Agricultural Marketing Council, for example, has established an ambitious target for Canada to capture four percent of world trade for agricultural and agri-food products by 2005.

At the same time, there is much sustainable development potential to adopting a new approach to growth based on the life science economy. This economy is founded on biological science and information technology. It builds on the growing awareness of how this knowledge can address quality-of-life issues by creating a whole new range of products and services in ways that address the social, economic, and environmental concerns of Canadians. This approach features a shift from conventional resources, such as fossil fuels, to alternative uses of agricultural products and by-products as renewable resources.

International environmental protocols affecting agriculture

- United Nations Framework Convention on Climate Change (and the Kyoto Protocol)
- United Nations Convention on Biological Diversity
- Cartagena Protocol on Biosafety
- Montreal Protocol on Substances that Deplete the Ozone Layer
- UNECE Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone
- UNECE Protocol on Persistent Organic Pollutants (POPs)
- North American Agreement on Environmental Cooperation
- North American Waterfowl Management Plan
- International RAMSAR Convention on Wetlands

(For more information, see Annex D for Web sites)

Economic snapshot

The agriculture and agri-food sector contributes to our food security, economic health, and social make-up. The sector

- is a $95-billion-a-year industry;
- exports more than $21 billion in products each year; and
- produces almost 10 percent of Canada's GDP.

Examples of these products include

- biofuels, such as ethanol and biodiesel;
- plastics and building materials derived from bio-products;
- flavourings, oils, dyes, and cosmetics from fruits;
- a variety of non-traditional foods, functional foods, and nutraceuticals; and
- other items, including an array of organic acids, cleansing agents, and waxes.

The regulatory environment

As a responsible member of the global community, Canada is party to a number of international agreements with environmental implications for agriculture (*see* Box). For example, under the Kyoto Protocol of the United Nations Framework Convention on Climate Change, Canada is working to reduce its greenhouse gas emissions to six percent below 1990 levels by 2008–2012.

Nationally, Canada provides legislative and regulatory protection to the environment through such federal acts as

- *Canadian Environmental Protection Act;*
- *Canadian Environmental Assessment Act;*
- *Fisheries Act;*
- the proposed *Species at Risk Act*; and
- *Pest Control Products Act.*

Agricultural practice is also regulated at the provincial level. At the municipal level, bylaws may address items of regional concern, such as the siting of livestock operations.

Regulation of biotechnology in Canada

Biotechnology is a tool — an enabling technology — in the agriculture and agri-food sector.

It applies scientific knowledge of biological systems, along with advances in bio-informatics and biochemistry, to create new and innovative ways of

- enhancing our renewable resource base;
- designing and extracting specific components of renewable resources; and
- combining these components in new and innovative ways.

This application is generating products, processes, and services with the potential to enhance the quality of life of Canadians by addressing economic, environmental, and social issues of concern to them.

Regulation of biotechnology in Canada

The Canadian Food Inspection Agency (CFIA) and Health Canada are responsible for regulating products derived through biotechnology. For genetically modified crop plants, the CFIA assesses the potential risk of adverse environmental effects and authorizes and oversees import permits, confined trials, unconfined release, and variety registration. Health Canada is responsible for assessing the human safety of products derived through biotechnology, including foods, drugs, cosmetics, medical devices, and pest-control products. In the case of new foods, each Health Canada safety assessment considers the process used to develop the new food, its characteristics compared to those of its traditional counterpart, its nutritional quality, the potential presence of any toxicants or anti-nutrients, and the potential allergenicity of any proteins introduced into the food.

Biotechnological research at Agriculture and Agri-Food Canada

Agriculture and Agri-Food Canada has no regulatory role with regard to biotechnology. Its role is that of research, the goal of which is to ensure the environmental and economic sustainability of Canada's agriculture and agri-food sector. This research involves innovative technologies to help shorten product development times, reduce research costs, introduce value-added characteristics, and foster sustainability. For example, modern biotechnological techniques are used to augment traditional breeding methodologies. These techniques include tissue culture, artificial fertilization, embryo transfer, preservation of genetic material through freezing (cryopreservation), genetic transformation, and molecular methods to diagnose diseases and select parents for breeding.

Environmental pressures and opportunities

To be sustainable, agro-ecosystems must be managed in ways that are compatible with the natural systems and processes to which they are connected. Many farmers have already adopted, or are adopting, environmentally sustainable practices, such as integrated pest management and precision farming methods. However, there remains room for improvement.

Environmental farm management

Agriculture requires inputs (soil, water, nutrients, and energy) to produce outputs (crops, livestock, and non-food products). For sustainable growth to occur, producers must optimize outputs on a relatively fixed land base, while minimizing inputs and environmental impacts. Sound input management practices are critical to protecting the environment, ensuring farm profitability, and addressing public concerns.

Farmers understand that good land stewardship promotes economically viable farms and prosperous rural communities. That is why many farmers across Canada are pro-active in addressing environmental concerns. Some are working through conservation districts and associations to identify and change practices that contribute to environmental pressures in their areas. Others use individual farm plans to identify and correct problem areas in their own operations.

Environmental snapshot

- Canada is the second-largest country in the world, with a land area of more than 900 million hectares, but less than one-tenth (about 68 million hectares) of this area is farmed.
- The main factor restricting crop and livestock production in Canada is climate.
- The Prairie provinces, where most of Canada's export grains and oilseeds are grown, have a frost-free period of about 110 days.
- Eastern Canada, where about two-thirds of Canada's population live, is more agriculturally diversified, producing livestock; horticultural crops; and grains and oilseeds, including corn, soft white winter wheat, and soybeans.

Soil

The health of Canada's agricultural soils can be degraded by a variety of processes, including wind and water erosion, loss of soil organic matter, structural breakdown, salinization, and chemical contamination. These processes make soil less suitable for crop production and may lead to reduced fertility, lower yields, and a drop in farm profitability. Some agricultural management practices contribute to these degradative processes, hastening their symptoms and effects. On the other hand, some agricultural land uses and management practices (such as various tillage methods, cropping systems, and nutrient management plans) help to stabilize or improve soil quality.

Water

The availability and quality of groundwater and surface water are currently among Canadians' chief environmental concerns. Agriculture depends on the availability of water of adequate quality. It also affects water quality when nitrogen and phosphorus from fertilizers and manure, pesticides, and pathogens (such as fecal coliforms) leach through the soil into groundwater, or when these substances, along with soil sediment, enter surface waters in runoff from farmland. Research also shows that some pesticides, fertilizers, and animal manures can behave as endocrine disruptors in the environment. Concerns for water quality are highest in areas of intensive cropping and livestock production.

Agriculture can also change water availability by such means as the construction of dams and reservoirs, irrigation, and wetland drainage. These changes may affect wildlife habitat and give rise to conflict with other users of water.

Agriculture is Canada's greatest consumer of water. At the same time that agricultural demand for water is growing, particularly for irrigation, other sectors are demanding more too, leading to conflict among users. Most rural residents are responsible for their own water supply. They are often affected first and most by the water shortages caused by drought in some parts of the country. With climate change and increases in population, urbanization, and consumption, the impact of droughts may become more serious.

Air

Agriculture affects air quality through the release of pesticides, offensive odours, small particulate matter, dust, and smoke. Small particulate matter consists of a variety of materials. Particles smaller than 2.5 micrometres pose a serious concern for human health.

Agriculture also contributes to changes in atmospheric levels of greenhouse gases and ozone-depleting substances. The release of greenhouse gases (which include methane, nitrous oxide, and carbon dioxide) from agricultural production increased slightly from 1981 to 1996 and now accounts for about 10 percent of Canada's total anthropogenic emissions. Growing concern over atmospheric changes has prompted global efforts to limit emissions of these gases under the United Nations Framework Convention on Climate Change. Climate change is a particular concern for agriculture, as even small changes in temperature or precipitation can alter farming conditions in Canada, potentially limiting productive capacity and production opportunities.

Stratospheric ozone depletion is a significant environmental issue in Canada. Much has been accomplished under the United Nations Montreal Protocol to Control Ozone Depleting Substances. Most significant for agriculture under this protocol is the planned phase-out of methyl bromide, a broad-spectrum soil and space fumigant used intensively in agriculture and agri-food production to control pests and diseases in the soil, facilities, and commodities. Canadian agriculture uses about 200 tonnes of methyl bromide a year, a small proportion of that used globally but still representative of significant economic activity. Canada is committed to phasing out the use of methyl bromide by 2005. Work is under way to find effective alternatives for this compound.

Odours arising from livestock production (mainly from manure) are a growing problem as the distance between suburbs and farms decreases. These unpleasant odours, caused by gases such as ammonia and hydrogen sulfide, are a nuisance for people living downwind of livestock operations. At high concentrations, they also pose a risk to human and animal health.

Pest management

Insecticides and herbicides can make their way into the air and water by runoff, volatilization, drift, and atmospheric deposition. Improper handling of pesticides can lead to spills and leaks. Pesticides are found in surface water and groundwater in most areas where they are used, but rarely at concentrations that exceed Canadian guidelines for drinking water quality. However, concentrations sometimes exceed guidelines for water used for irrigation and for the protection of aquatic life.

In addition to the social and environmental concerns associated with pesticide use, farmers are also concerned about the build-up of herbicide and insecticide tolerance in certain weed and insect species. Together with some management techniques, these can lead to a shift in the weed and insect spectrum.

The importance of biodiversity in agriculture

As a natural-resource-based industry, agricultural production relies on a multitude of living organisms — from the agricultural plants and animals from which we derive food and fibre, to the micro-organisms that play a role in soil and plant health, and the insects that pollinate plants.

A healthy variety of organisms ensures that the necessary raw materials are there to respond to future environmental, social, and economic pressures. Just as important to agriculture are biodiversity's contribution to:

Ecosystem health: Biodiversity is particularly important in agro-ecosystems where organisms are extensively managed. Integrated pest management techniques that take advantage of the benefits of the synergies and host-predator balances existing in nature offer alternatives to input-intensive agriculture.

Risk reduction: Genetic diversity decreases the susceptibility of crops and livestock to pandemics of pests or pathogens. It also helps to decrease the response time required to adapt to frequent changes in the production, management, and economic environments.

Research potential: The development of new varieties, hybrids, and breeds is possible only where diverse stocks are available. Biodiversity also provides potential resources for disease research, which often relies on divergent responses to detect useful genetics.

Market adaptability: Biodiversity enables domestic species to be more adaptive to changing markets. It also allows for the development of niche market and new foreign markets in response to market pressures.

Biodiversity

Biodiversity refers to the variety of life on Earth, including all species of plants, animals, and micro-organisms, both wild and domesticated, living and interacting within an ecosystem. Over the years, the biodiversity of plants and animals domesticated for agricultural use has changed. By concentrating primarily on the most productive varieties and breeds, the industry has contributed to the genetic erosion of some crop varieties and livestock breeds. Agriculture has also had an impact on natural biodiversity in the process of creating farmlands — clearing woodlands, breaking grasslands and draining wetlands — and through more intensive farming practices.

On the other hand, market opportunities have led to the introduction of new crops and livestock into many parts of the country. The department and the sector have also contributed to biodiversity conservation and sustainable use of the earth's organisms by

- ensuring that gene banks are maintained to conserve genetic resources important to crop breeding and research programs;
- developing new genetic combinations in crop varieties to reduce the need for chemical inputs;
- managing natural grasslands within community pastures and private rangelands;
- planting shelterbelts and woodlots, which provide wildlife habitat; and
- scientifically identifying and classifying species of plants and animals important to agriculture.

A final word

Overall, Canada's agricultural sector is responding well to environmental, social, and economic pressures. These pressures are likely to grow, calling for an ongoing process of adaptation for economies, businesses, and citizens. For agriculture, this adaptation process will include finding new sources of growth and development, and developing and disseminating sustainable technologies and knowledge, while at the same time maintaining a healthy natural resource base.

for Sustainable Development

The agriculture and agri-food sector is faced with greater challenges today than in previous eras to demonstrate to the Canadian public and international community that sectoral commitment to world-class environmental standards is as strong as the commitment to increased productivity and growth. Issues such as the growing public concern over the potential for livestock operations to adversely affect water quality have brought agriculture in general under greater scrutiny.

Both farmers and the public expect governments to play an active role in working with the sector to accomplish on-farm environmental improvements and minimize off-farm environmental effects. Agriculture and Agri-Food Canada (AAFC) is well positioned to act nationally as a catalyst for change by working with other federal departments, provincial and territorial governments, the science community, and other stakeholders.

The elements of a new approach

Traditional policy approaches are no longer adequate, given the pace of change in Canadian agriculture today. New and more aggressive approaches are needed if farmers are to be equipped with the means to fully integrate environmental improvements into their changing farm-management systems.

Two fundamental components form the basis of AAFC's approach to sustainable development. First, we are adopting a new way to work with partners within the food system to better integrate sustainable development considerations into managing the risks associated with financing, production, supply, market, health, and the environment. Second, we are implementing a strategy for sectoral growth built on science, innovation, and knowledge, and on the development of new products and services that are more environmentally sustainable. These components are guiding the department's vision for the future of Canadian agriculture.

Broadening the risk-management framework

We have traditionally addressed risks to farm income mainly through a series of income stabilization programs. This approach has been successful but has not fully integrated the management of other factors, such as the environmental risks associated with agricultural production. Increasingly farmers, provincial governments, and the federal government have come to recognize the importance of developing a framework that better links income support programming with food safety and environmental objectives. In response to this, we will consult with stakeholders to create and contribute to strategic alliances that will foster a broader approach to risk management.

Growth through innovation

The foundation of sustainable development is the concept that growth is accomplished in a manner that is consistent with long-term social, economic, and environmental objectives. Recent economic-growth strategies have focussed on increasing the production of traditional commodities and expanding markets, both domestically and abroad. These strategies have had mixed results in terms of sustainable development. Increasing productivity has tended to increase the intensity and concentration of production, generating on-farm and off-farm environmental concerns.

The life science economy's contribution to sustainable agriculture

Bio-products can help address a wide range of society's environmental concerns. In agricultural production, for example, the development of natural pesticides to control weeds and insects could reduce the use of synthetic chemicals; new feeds may offer opportunities to simultaneously increase livestock efficiency and reduce emissions of methane and nitrous oxide; and the use of bio-fuels could greatly reduce the use of fossil fuels, which produce large amounts of greenhouse gases.

A greater use of bio-based renewable products for alternative food and industrial uses could lead the sector to more secure and diverse markets, higher farm sales and income, and crop diversification. In addition to producing food, farmers would also be able to supply manufacturers with the raw ingredients to produce such things as fuel for cars, construction materials, industrial chemicals, and pharmaceuticals.

An innovative approach to growth based on the life science economy would move the agriculture and agri-food system from one primarily focused on food and feed, to one that includes both traditional and non-traditional agricultural products. This sustainable development strategy will contribute to the current departmental recognition of the life science economy as a contributor to growth for the sector (*see* Box).

Building on our strengths

Successfully positioning Canada as a world-class leader in sustainable agriculture means

- having a world-class capacity for research and development;
- offering a competitive business and investment climate;
- being internationally recognized as a centre of knowledge and expertise, with the capacity to manage and interpret information to meet the diversity of needs in our modern society;
- having an education and training infrastructure that produces knowledge workers; and
- having business and social infrastructures that attract and retain these skilled workers.

We can play an important role in working with our partners in government, industry, and rural communities to achieve these goals.

Research and development

We contribute to sustainable agriculture through a variety of research and development activities. We work in partnership with the provinces, universities, communities, and the private sector through our network of research centres and field offices. Our research goal is to develop and promote practices that are environmentally sound and to find innovative ways for the sector to reduce costs, increase productivity, and improve the quality and safety of products. Continued investments in scientific understanding and innovation will help meet the environmental and economic challenges facing the sector, as well as reap the benefits of emerging opportunities.

In particular, this sustainable development strategy will contribute to improving the health of our soil, water, air, and biodiversity by focusing research and development efforts on increasing the understanding of the interactions between natural resources and agricultural production. This information will improve the sector's and the department's decision-making capacity. We will also concentrate our efforts on developing and promoting better or new on-farm management practices and technologies that increase environmental performance while maintaining or increasing the sector's productivity.

Stewardship approach

Agriculture and Agri-Food Canada has limited regulatory authority with respect to environmental performance. As a result, our traditional approach has been to influence behaviour through numerous adaptation and stewardship initiatives designed to help the Canadian agriculture and agri-food sector adapt to an evolving business climate, domestically and internationally. These initiatives work by providing transitional measures to strengthen business and environmental management skills and practices, and to respond cooperatively to

opportunities for diversification and value-added production. A case in point is our Canadian Adaptation and Rural Development (CARD) fund. Based on an innovative partnership with industry, CARD has allocated and administered funds in the areas of human resources development, rural development, research and development, marketing, food safety, and the environment. Supporting environmental improvement and encouraging adaptation by agricultural producers will continue to be a key tool in this sustainable development strategy.

Making the most of opportunities

The sector could be affected by new environmental rules from multilateral environment agreements or by new trade rules from international trade agreements. Multilateral trade and environmental agreements will be assessed to ensure environmental and economic implications are understood and appropriately addressed.

In addition, increasing trade liberalization, globalization, and technological improvements have boosted agricultural productivity. The sector is always looking for ways to increase its domestic and international market share, and we will continue to support it in this endeavour. We will work to provide the sector with the information and technologies it needs, not only to optimize production, but also to avoid negative impacts on the environment. We will also promote a wider range of non-traditional agricultural products, both food and non-food. These products present a potentially lucrative market for the sector and offer Canadians attractive alternatives to traditional goods.

Agriculture and Agri-Food Canada's Sustainable Development Principles

We will

- actively cooperate with all our stakeholders as we promote sustainable agriculture and agri-food production;
- build on and support a market system that accounts for environmental sustainability, economic productivity and competitiveness, and social concerns;
- encourage environmentally responsible practices today to avoid future environmental liabilities;
- encourage the integration of social, environmental, and economic thinking in decision-making both within the sector and in our own operations;
- promote an ecosystem approach to better place agriculture and agri-food activities in the context of the broader environment; and
- promote proactive, rather than reactive, approaches to the stewardship and protection of the resource base and the environment.

Leading by example

Agricultural and Agri-Food Canada's leadership capacity is based on a strong policy role. We currently undertake environmental assessments as part of the development of departmental policies and projects to ensure that environmental issues are addressed early in our decision-making. We can, however, do more. We are developing the analytical and modeling capacity to link short- and long-term environmental effects with economic parameters to better predict the impacts of our policies and programs. Complementing this, we are improving our ability to determine and monitor the state of the agricultural environment through environmental performance indicators. Applying a sustainable development lens to our departmental decision-making process and encouraging people on the farm and in the food-processing plant to do the same will ensure that the social, environmental, and economic implications of proposed actions are considered and that opportunities to promote sustainable agriculture are realized.

Finally, we can ask no more of the sector than what we ourselves are prepared to undertake. Greening our departmental operations shows that we are serious about our commitment to sustainable development and, at the same time, demonstrates good environmental practices to the sector and to all Canadians.

Our sustainable development commitment

We will work with our partners and stakeholders to ensure a better quality of life for all Canadians by

- improving the environmental health of the agricultural landscape for present and future generations;
- promoting a prosperous and viable sector where growth is achieved in an environmentally sustainable manner; and
- contributing to sustainable communities.

We are committed to integrating sustainable development into our decision-making process and to maintaining the highest environmental standards in the operation of our own department.

The next sections detail exactly how AAFC will address the long-term challenges facing the sector and take advantage of new opportunities on the path towards sustainable development. This strategy is not a list of all ongoing or planned departmental activities that can be linked to the environment. Rather, it is an attempt to provide a framework in which the department, the sector, and the Canadian public can clearly see the areas in which we will be focusing our efforts over the next years to contribute significantly to sustainable development in Canadian agriculture.

While our main focus remains those areas that most affect the environment, we have made an effort to address all three components of sustainable development (social, economic and environmental) in an integrated fashion.

Our approach is organized around four themes or strategic directions:

1. Environmental sustainability of our natural resources;
2. Prosperous and viable sector in a sustainable manner;
3. Contribution to sustainable communities; and
4. Sustainable development integrated in departmental policies, programs, and operations.

The first three strategic directions represent the major linkages between the agriculture and agri-food sector and the quality of life of Canadians, while the fourth specifically deals with actions within our own operations.

Monitoring our progress

We regularly plan, report on, and monitor departmental business line activities to ensure that we achieve and improve on the performance targets we have set for ourselves. During the drafting of this, our second, sustainable development strategy, we realigned departmental business lines to include "Health of the Environment" as one of the three lines, thus elevating the importance of environmental issues to the department and to the sector. This change will help in implementing the strategy and ensuring that the concept of sustainable development is integrated into the decision-making of all departmental branches. Furthermore, it will ensure that our performance is monitored and reported on annually, through the Departmental Performance Report and the Departmental Report on Plans and Priorities.

Complementary to the ongoing departmental business line processes, we have developed a management framework that outlines the departmental process for implementing, monitoring, improving, and reporting on sustainable development commitments. This framework will help to clearly identify roles, responsibilities, and accountabilities, and to facilitate more complete and objective performance reporting.

Agri-environmental indicators

A commitment under our first sustainable development strategy was the development of agri-environmental indicators that would serve as measures of key environmental conditions, risks, and changes resulting from agriculture, and of management practices used by producers. Fourteen agri-environmental indicators were developed within six categories: environmental farm management, soil quality, water quality, greenhouse gas emissions, agro-ecosystem biodiversity, and production intensity.

These indicators are used extensively in this strategy as performance measures for a number of sectoral targets. Many of these indicators use data from the *Census of Agriculture*, collected every five years. For this reason, 1996, the year of the last census, is often used as a baseline for these measures, and 2006 was set as the target year (2001 census data could serve as an interim measure). Processing and interpreting these data takes time, however, and a lag is to be expected before results can be reported.

Measuring performance

Through the use of performance targets, progress in implementing this sustainable development strategy will be reported for all of the objectives. These objectives represent long-term priority areas. Clear, measurable, and time-bound performance targets were set for each objective, each target being linked to one or more performance measures that will indicate how well we reach these targets. Two types of performance targets are used in this strategy to show progress made by the department and by the sector: departmental targets and sectoral targets.

Departmental targets describe what Agriculture and Agri-Food Canada will achieve within the scope of this strategy — outcomes that we are directly responsible for. They broadly aggregate the various departmental activities that contribute to our sustainable development objectives. Where they do not already exist, baselines for these targets will be established by 2003. Though not listed in this document, departmental activities that help to meet the strategy's objectives have their own performance targets and measures. Performance results at the activity level will feed into the target assessment and help in assessing whether overall objectives have been met.

Sectoral targets include agri-environmental targets, agri-economic targets, and agri-social targets. They represent the long-term direction, or desired states, for the sector. Measuring performance at this level poses an important challenge, because departmental attribution (linking departmental activities to external environmental outcomes) is difficult to establish. We understand that we can only contribute to success in meeting sectoral targets, as they are also affected by a variety of other factors beyond our control, factors that may ultimately affect the adoption of sustainable practices. These targets are intended to provide important information that others and we can use to establish and adjust policy and research priorities and to focus efforts on the economic, social, and environmental sustainability of the sector. Baselines for sectoral targets are detailed in Annex C.

Continuous improvement

Further work, internally or with our partners, is required in some instances to refine these performance targets and measures, or even to develop new or better ones, to ensure that this sustainable development strategy's planning and reporting processes complement those of the department and reinforce our direction. Careful monitoring will enable us to identify any corrective actions needed during the three-year period of the strategy. AAFC's Review Branch will conduct an internal review after 18 months. This review, along with yearly reporting on performance, will enable us to monitor our progress and accomplishments, and to make any necessary adjustment to our objectives, targets, and measures.

Strategic Direction 1

Environmental

Agricultural production is closely linked to the natural environment. Farming changes natural ecosystems to provide benefits, including food and fibre. Soil, water, air, and biodiversity are fundamental to agricultural productivity. At every point of interaction, agriculture has the potential to affect the various components of the environment negatively or positively.

The environmental risks associated with agriculture can be reduced by sound decision-making at all levels of responsibility. Most important are the decisions made by farmers, because it is they who decide what to produce and how it should be produced. Their choices have the greatest influence on the health of the resources on which agriculture depends. In this section we discuss these resources, examining ways to conserve them and to capitalize on multiple benefits.

A) Natural resources

Important steps have already been taken to develop and encourage agricultural practices that balance production needs with the conservation of on-farm natural resources. There is more to be done, though, especially in minimizing or eliminating adverse effects on the physical environment off the farm.

Continued scientific research and development is needed to increase our knowledge of interactions between agriculture and the natural environment, and to form a sound basis for decision-making to support the adoption of sustainable farming and processing methods. We will continue to work in these areas, in partnership with the sector and with other stakeholders, to improve the health of Canada's soil, water, and air, both on and off the farm.

Objective 1.1:

Improve the health of our soils

Soil health is a key component of sustainable agriculture. Farmers reap the economic benefits of improved soil health through increased productivity. Because they enjoy property rights over agricultural soils, farmers have a direct economic incentive to manage them sustainably. Soils also benefit society as a whole, because they play important roles in the mitigation of adverse environmental effects by purifying and detoxifying ecosystems, decomposing wastes, and acting as a carbon sink.

At a national level, the health of Canada's agricultural soils has generally been maintained or improved over the past 20 years as a result of conservation management practices. However, some soils remain at risk of degradation by erosion, salinization, loss of organic matter, and compaction. This risk is especially high in areas of intensive cultivation.

Erosion

Soil erosion is the redistribution of soil in the landscape due to the action of wind, water, and tillage. The effects of soil erosion on crop quality and yields can be substantial, and erosion may also negatively affect off-farm air and water quality, as well as wildlife habitat. Most farmers rely on crop residues and stable soils to control erosion. Under appropriate conditions, some also use conservation tillage practices, annual windbreaks, permanent shelterbelts, grassed waterways, terracing, or perennial vegetation.

Salinization

Soil salinity is a natural condition that occurs in certain regions, in which soluble salts are found in the root zone of plants. Saline soils are those that contain enough soluble salts to adversely affect the growth of most crop plants. Water from precipitation during fallow or idle periods between crop plantings is thought to be the primary source of the more recent saline seeps. Choice of crops, summerfallow practices, snow management, and drainage allow some control over water entry into soils and water movement below the root zone.

Soil organic matter

A vital component of the topsoil is soil organic matter, made up of soil microbial biomass and the products of decomposition. Organic matter is a key component of soil health. Among its many benefits, soil organic matter

- stabilizes soil structure and makes soil less prone to erosion;
- improves the ability of the soil to transmit and store air and water;
- stores and supplies many nutrients needed by plants and soil organisms;
- keeps the soil workable; and
- binds potentially harmful toxins, such as heavy metals and pesticides.

Soil organic matter is made up largely of carbon. Removing carbon dioxide from the atmosphere through photosynthesis and storing the carbon in the soil helps to reduce the accumulation of carbon dioxide, a greenhouse gas, in the atmosphere. Farm management practices that contribute to improved levels of soil organic matter, and thus of soil carbon, include reduced tillage and crop residue management, reduced summerfallow, extended crop rotations, adequate addition of nutrients, green manure plowdown, continuous cropping, and erosion control.

Reducing wind erosion

Shelterbelts are lines of trees or bushes planted across the prevailing wind direction to break the force of the wind and reduce wind erosion and wind damage. They also provide wildlife habitat; create favourable microclimates; and trap fine, wind-blown soil particles before they can enter waterways. In addition, shelterbelts help to reduce the movement of snow in winter and to curb peak runoff flows in spring. Studies in some countries have shown they can even filter some of the spray aerosols drifting in air from cultivated areas, reducing the amount of these pesticides deposited on surface waters.

What does all this mean? Improved crop yields for the farmer, for one thing. But the benefits don't end there.

The shrubs and trees in shelterbelts sequester carbon, helping to reduce the level of carbon dioxide in the atmosphere. Under Agriculture and Agri-Food Canada's Shelterbelt Program, an estimated 5.3 million tonnes of carbon was sequestered by shelterbelts between 1990 and 1998.

Compaction

Another factor defining soil health is soil compaction. Compaction reduces soil porosity, limiting the amount of air and water that can enter the soil. This, in turn, constrains the amount of decomposition of organic matter that can take place in the soil. Soils have a natural state of compactness, depending on how they were deposited and the parent material from which they were formed. Certain agricultural practices compound the problem of soil compaction. Heavy farm machinery compacts the soil, especially when it is wet (in early spring and late fall). The more field traffic there is, the more compaction will occur. Practices that result in the loss of soil organic matter also contribute to soil compaction.

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Our commitment

Agriculture and Agri-Food Canada will

- **work with the sector and other stakeholders to increase the sector's capacity to manage soil resources and adopt conservation practices aimed at the long-term sustainability of agricultural soils in all regions of Canada;**
- **conduct research and development activities to develop innovative practices, technologies, and management practices related to soil health, and to increase our understanding of factors affecting soil health;**
- **engage in education and awareness activities to promote best practices and demonstrate their effectiveness to the sector. Information will be provided to the sector on ways to optimize production and minimize negative impacts on the environment; and**
- **evaluate policy options that could enhance the sector's capacity to manage soil resources.**

Departmental targets:

1.1.1 On an ongoing basis, AAFC will undertake or fund research projects related to soil conservation to increase the understanding of factors affecting soil health.

Performance Measure: 1) Yearly number of related research projects undertaken or funded (new and ongoing).

1.1.2 On an ongoing basis, AAFC will undertake or fund initiatives, including education and awareness activities, to increase the adoption by producers of best practices or technologies that conserve or improve soil resources.

Performance Measure: Yearly number of related 1) communications initiatives; 2) educational materials produced; 3) Estimate of the number of producers reached; and 4) number of hectares having improved land management with AAFC involvement.

1.1.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options that could enhance the sector's capacity to manage soil resources.

Performance Measure: Yearly number of related 1) policy-analysis reports; 2) agreements signed; and 3) programs developed and implemented.

Agri-environmental targets:

1.1.4 By 2006, there will be an increase in the proportion of Canadian cropland at tolerable risk of water, wind, and tillage erosion.

Performance Measure: 1) Share of cropland at tolerable risk of water erosion; 2) Share of cropland at negligible risk of wind erosion; 3) Share of cropland at tolerable risk of tillage erosion.

1.1.5 By 2006, there will be an increase in the proportion of Canada's farmland accumulating soil organic carbon.

Performance Measure: 1) Share of Canada's farmland accumulating soil organic carbon.

1.1.6 By 2006, there will be a decrease in the risk of soil compaction in susceptible areas.

Performance Measure: 1) Share of farmland with soils susceptible to compaction under cropping systems that cause compaction; 2) Share of farmland with highly compacted soils under cropping systems that reduce soil compaction.

1.1.7 By 2006, there will be an increase in the proportion of Prairie cropland at low risk of salinization.

Performance Measure: 1) Share of cropland at low risk of soil salinization.

See Annex C for details on baselines for agri-environmental measures.

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- **work with the sector and other stakeholders to increase the sector's capacity to manage soil resources and adopt conservation practices aimed at the long-term sustainability of agricultural soils in all regions of Canada;**
- **conduct research and development activities to develop innovative practices, technologies, and management practices related to soil health, and to increase our understanding of factors affecting soil health;**
- **engage in education and awareness activities to promote best practices and demonstrate their effectiveness to the sector. Information will be provided to the sector on ways to optimize production and minimize negative impacts on the environment; and**
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Performance Measure: Yearly number of related 1) policy-analysis reports; 2) agreements signed; and 3) programs developed and implemented.

Agri-environmental targets:

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Performance Measure: 1) Share of cropland at tolerable risk of water erosion; 2) Share of cropland at negligible risk of wind erosion; 3) Share of cropland at tolerable risk of tillage erosion.

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Performance Measure: 1) Share of Canada's farmland accumulating soil organic carbon.

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Performance Measure: 1) Share of cropland at low risk of soil salinization.

See Annex C for details on baselines for agri-environmental measures.

Protecting water quality

Farmers can help to improve water quality by controlling runoff and erosion, improving the management of agricultural inputs and wastes, and making use of buffer zones and shelterbelts. Practices to protect water quality are often the same ones proven successful in promoting soil conservation.

The Health of Our Water, Agriculture and Agri-Food Canada, 2000

Objective 1.2:

Improve the health of our water

The health of our water is one of Canadians' chief environmental concerns. Agricultural producers need water of adequate quality to grow crops and raise livestock. Water is also needed for agri-food industries and rural households. The wise stewardship of our water resources is critical for sustainable agriculture.

Water quality

Some agricultural management practices contribute to declining water quality, particularly in intensively farmed areas where manure, fertilizer, and pesticides are applied inappropriately. This contribution can be difficult to measure because of the nature of farming and the diversity of land, climate, and farming practices across the country, but it is significant. Soil erosion, surface runoff, and leaching are the main ways that crop nutrients, pesticides, and pathogens move into surface water and groundwater. Water contamination by pesticides is treated under Strategic Direction 3.

Nutrients, mainly nitrogen and phosphorus, are applied to crops in the form of chemical fertilizers or manure. Used sustainably, these inputs help maintain soil health and increase productivity and economic returns. However, applied in excess or under the wrong conditions, they may negatively affect yields, contribute to surface and groundwater pollution, and waste farm resources. These nutrients seldom reach toxic levels in surface waters, but they contribute to eutrophication of rivers and lakes. Nitrate is present in nearly all groundwater underlying agricultural land in Canada, but usually at levels below those stated in the *Guidelines for Canadian Drinking Water Quality*. Concentrations are usually highest in areas where crops with high nitrogen needs are produced, livestock density is high, soils are permeable, crops are irrigated, or heavy rainfall is received.

Farmers can help improve the health of water by controlling runoff and erosion, and by improving nutrient management. Environmental farm plans and nutrient management plans can help them manage the environmental risks and assets on their farms holistically.

Water availability

Water management is another critical factor influencing agricultural sustainability. Water management in Canada has traditionally focused on maintaining supply and withdrawing water at rates that do not exceed replenishment, but demand management is now becoming more common. In agricultural terms, demand management involves finding ways of using existing water more efficiently (e.g., using high-efficiency irrigation systems), learning to farm with less water, and facing the prospect of paying for water that has historically been a free or low-cost resource. Growing conflict between users is also raising questions about reforming water rights and changing allocation practices.

In Canada's driest regions, or during dry periods, irrigation is sometimes used to maintain productive agriculture. Year-round water supplies are maintained in storage reservoirs and dugouts, particularly in the Prairies. In contrast, artificial drainage has allowed wet areas of Canada to be brought into profitable agricultural production. Good drainage improves plant growth and yields, helps reduce soil salinity, and allows farmers a wider selection of crops and a longer growing season. However, surface and subsurface drainage systems can also alter the physical environment and remove wildlife habitat by draining wetlands or removing riparian zones. They can also contribute to declining water quality.

Our commitment

Agriculture and Agri-Food Canada will

- **work with the sector and other stakeholders, targeting areas of intensive crop and livestock production, to enhance the sector's capacity to reduce the risk of water contamination by manure or nutrients (nitrogen and phosphorus), and to enhance the capacity of primary agriculture and agri-food processing to manage water resources and achieve more efficient water use;**
- **conduct research and development activities to develop innovative practices, technologies, and management practices related to improving water quality and water management, and to increase our understanding of factors affecting water quality and availability;**
- **engage in education and awareness activities to promote best practices and demonstrate their effectiveness to the sector. Information will be provided to the sector on ways to optimize production and minimize negative effects on the environment; and**
- **evaluate policy options that could improve public access to good-quality, secure water supplies.**

Departmental targets:

1.2.1 On an ongoing basis, AAFC will undertake or fund research projects related to water quality, sustainable nutrient management, and sustainable irrigation, to increase the understanding of factors affecting water quality and availability.

Performance Measure: 1) Yearly number of related research projects undertaken or funded (new and ongoing); 2) Yearly number and type of new technologies for irrigation and water treatment investigated.

1.2.2 On an ongoing basis, AAFC will undertake or fund initiatives, including education and awareness activities, to increase the adoption by producers of best practices or technologies that conserve the water resource.

Performance Measure: Yearly number of related 1) communications activities; and 2) education materials produced; 3) Estimate of number of producers reached; 4) Availability and distribution of technical information related to water supply and quality to rural residents and agricultural enterprises.

1.2.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options that could enhance the sector's capacity to manage water resources.

Performance Measure: Yearly number of related 1) policy-analysis reports; 2) agreements signed; and 3) programs developed and implemented.

Agri-environmental targets:

1.2.4 By 2006, there will be an increasing trend in the adoption of best practices for nutrient management.

Performance Measure: Management of farm nutrient inputs, nine sub-indicators: 1) Method of fertilizer application; 2) Timing of nitrogen application; 3) Reduction of fertilizers applied to offset nutrient content of manure; 4) Use of soil testing; 5) Storage method for liquid manure; 6) Storage method for solid manure; 7) Liquid manure storage capacity; 8) Manure application method; and 9) Timing of liquid manure application.

1.2.5 By 2006, there will be a decrease in the proportion of farmland at intermediate and high risk of water contamination by nitrogen and phosphorus in susceptible areas.

Performance Measure: 1) Share of farmland where the risk of water contamination by nitrogen is low; 2) Share of farmland where water contamination by phosphorus is low.

1.2.6 By 2006, there will be an increasing trend in the adoption of best practices for water use by farms and food-processing facilities.

Performance Measure: Will be developed and a baseline established by 2003.

See Annex C for details on baselines for agri-environmental measures.

Our commitment

Agriculture and Agri-Food Canada will

- **work with the sector and other stakeholders, targeting areas of intensive crop and livestock production, to enhance the sector's capacity to reduce the risk of water contamination by manure or nutrients (nitrogen and phosphorus), and to enhance the capacity of primary agriculture and agri-food processing to manage water resources and achieve more efficient water use;**
- **conduct research and development activities to develop innovative practices, technologies, and management practices related to improving water quality and water management, and to increase our understanding of factors affecting water quality and availability;**
- **engage in education and awareness activities to promote best practices and demonstrate their effectiveness to the sector. Information will be provided to the sector on ways to optimize production and minimize negative effects on the environment; and**
- **evaluate policy options that could improve public access to good-quality, secure water supplies.**

Departmental targets:

1.2.1 On an ongoing basis, AAFC will undertake or fund research projects related to water quality, sustainable nutrient management, and sustainable irrigation, to increase the understanding of factors affecting water quality and availability.

Performance Measure: 1) Yearly number of related research projects undertaken or funded (new and ongoing); 2) Yearly number and type of new technologies for irrigation and water treatment investigated.

1.2.2 On an ongoing basis, AAFC will undertake or fund initiatives, including education and awareness activities, to increase the adoption by producers of best practices or technologies that conserve the water resource.

Performance Measure: Yearly number of related 1) communications activities; and 2) education materials produced; 3) Estimate of number of producers reached; 4) Availability and distribution of technical information related to water supply and quality to rural residents and agricultural enterprises.

1.2.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options that could enhance the sector's capacity to manage water resources.

Performance Measure: Yearly number of related 1) policy-analysis reports; 2) agreements signed; and 3) programs developed and implemented.

Agri-environmental targets:

1.2.4 By 2006, there will be an increasing trend in the adoption of best practices for nutrient management.

Performance Measure: Management of farm nutrient inputs, nine sub-indicators: 1) Method of fertilizer application; 2) Timing of nitrogen application; 3) Reduction of fertilizers applied to offset nutrient content of manure; 4) Use of soil testing; 5) Storage method for liquid manure; 6) Storage method for solid manure; 7) Liquid manure storage capacity; 8) Manure application method; and 9) Timing of liquid manure application.

1.2.5 By 2006, there will be a decrease in the proportion of farmland at intermediate and high risk of water contamination by nitrogen and phosphorus in susceptible areas.

Performance Measure: 1) Share of farmland where the risk of water contamination by nitrogen is low; 2) Share of farmland where water contamination by phosphorus is low.

1.2.6 By 2006, there will be an increasing trend in the adoption of best practices for water use by farms and food-processing facilities.

Performance Measure: Will be developed and a baseline established by 2003.

See Annex C for details on baselines for agri-environmental measures.

Objective 1.3:

Improve the health of our air

Agriculture occupies 68 million hectares across Canada and, because of its nature, scale, and intensity, contributes to the emissions of gases that may affect air quality and climate. Agriculture, however, not only affects air quality, but is also affected by it.

Because farmlands are managed so intensively, farmers can control, at least partly, the amounts of gases released. Various farming methods and practices produce different types and levels of emissions, opening up various options to improve air quality and help to mitigate the atmospheric accumulation of greenhouse gases. Some management options may reduce the emission of a number of air pollutants at the same time. For example, improving manure management practices can reduce the emission of gases responsible for unpleasant odours, as well as those that contribute to climate change. Some soil-conservation practices can reduce emissions of particulate matter (dust, smoke).

Greenhouse gases

About 10 percent of Canada's anthropogenic greenhouse gas emissions derive from agricultural production, excluding the use of fossil fuels or the emissions from fertilizer production. The main greenhouse gases emitted by agricultural activities are nitrous oxide, coming from fertilizer and animal manure use, and methane, associated with cattle and with livestock manure. Producers need to mitigate these emissions while also planning how to adapt to climate change in the longer term. Unlike for other sectors, carbon dioxide emissions account for only a small fraction of greenhouse gas emissions in the agricultural sector. However, some land management practices on farms show potential for removing carbon dioxide from the atmosphere and storing it in soils (carbon sequestration), benefiting both the atmosphere and the soil.

Managing agro-ecosystems for success

Because agro-ecosystems are intensively managed, they present many opportunities for farmers to adopt measures that reduce their agricultural greenhouse gas emissions. Furthermore, healthy agro-ecosystems are often associated with improved efficiency, and many practices that reduce emissions or sequester carbon can also have other favourable effects, such as lower production costs, improved soil and water conservation, and healthier ecosystems.

Ozone-depleting substances

Canada is committed under the Montreal Protocol to phasing out the use of methyl bromide by 2005. Canada's use of this compound is very low by world standards, and cooperative research and demonstration projects by government and industry have already helped to reduce the use of this compound significantly. Some alternatives to methyl bromide have been identified, including different chemicals and methods. For example, a guideline has been prepared to encourage the use of integrated pest management, combining preventative and treatment practices, to control pest problems in food-processing facilities. However, work is needed to develop alternatives to methyl bromide and to encourage the sector's adoption of these alternatives before the phase-out is completed.

Odours

Farm odours can cause significant conflict between farmers and neighbouring communities. These conflicts have given rise to municipal action to control the siting of intensive livestock operations. Several options are available to farmers to help curb odours, including relocating odour sources downwind, reconstituting livestock feeds, using different livestock breeds, and using better methods of manure handling, storage, and land application.

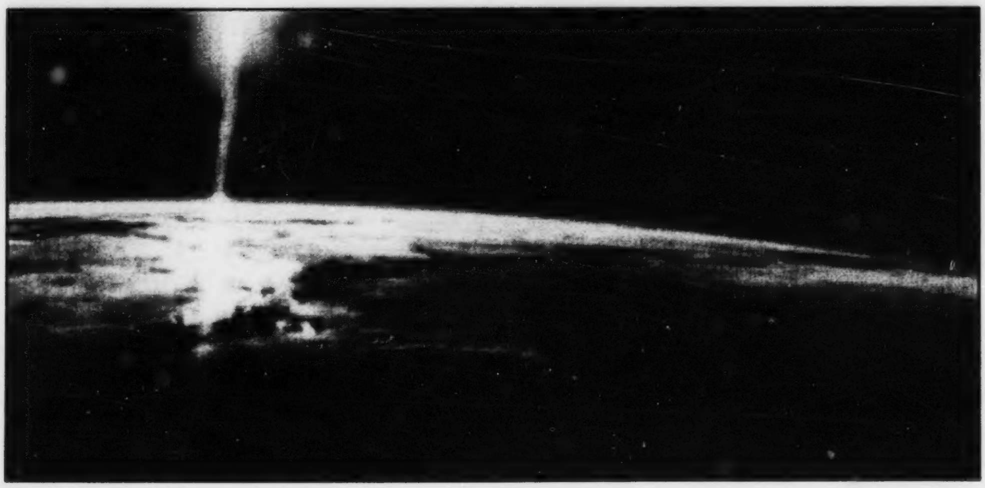
Particulate matter

Farms emit particulate matter in two forms: primary particles (most commonly dust from soil erosion and smoke from burning crop residue) and secondary particles (formed in the air from gases emitted by agriculture, such as ammonia). Land management practices that minimize soil erosion and manure management practices that limit ammonia emissions directly reduce the agricultural emissions of particulate matter.

Our commitment

Agriculture and Agri-Food Canada will

- **work with the sector and other stakeholders to reduce agricultural emissions that affect air quality, the ozone layer, and climate change. In doing so, we will ensure that the agriculture and agri-food sector contributes its share to meeting Canada's targets under the Kyoto Protocol and the Montreal Protocol;**
- **conduct research and development activities to support sustainable farming systems based on innovative practices, technologies, and management practices, and to increase our understanding of factors affecting air quality, climate change, and their impact on agriculture;**
- **engage in education and awareness activities to promote best practices and demonstrate their effectiveness to the sector. Information will be provided to the sector on ways to optimize production and minimize negative impacts on the environment; and**
- **evaluate policy options that could enhance the sector's capacity to mitigate impacts on air and on the ozone layer, and to adapt to climate change.**



Departmental targets:

1.3.1 On an ongoing basis, AAFC will undertake or fund research projects related to air quality, the ozone layer, and climate change to increase the understanding of factors affecting air quality, climate change, and their impact on agriculture.

Performance Measure: 1) Yearly number of related research projects undertaken or funded.

1.3.2 On an ongoing basis, AAFC will undertake or fund education and awareness initiatives to increase the adoption by producers of best practices or technologies that mitigate poor air quality, ozone depletion, or the agriculture's impact on climate change.

Performance Measure: Yearly number of related 1) communications activities; and 2) educational materials produced; 3) Estimate of number of producers reached.

1.3.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options that could enhance the sector's capacity to mitigate their impact on air quality.

Performance Measure: Yearly number of related 1) policy-analysis reports; 2) agreements signed; and 3) programs developed and implemented.

Agri-environmental targets:

1.3.4 By 2006, there will be a decrease in greenhouse gas emissions by agriculture, and an increase in the proportion of Canada's farmland accumulating soil organic carbon.

Performance Measure: 1) Agricultural emissions of greenhouse gases; 2) Share of Canada's farmland accumulating soil organic carbon.

1.3.5 By 2003, there will be a 70-percent reduction in the consumption of methyl bromide by the agriculture and agri-food sector.

Performance Measure: 1) Methyl bromide quotas (actual use).

1.3.6 By 2006, there will be an increasing trend in the adoption by producers of best management agricultural practices or technologies that reduce emissions of odours and particulate matter.

Performance Measure: Will be developed and a baseline established by 2003.

See Annex C for details on baselines for agri-environmental measures.

B) Biodiversity

Biological diversity, or biodiversity, has sometimes been interpreted as limited to wildlife. However, the term actually encompasses all life on earth. Biodiversity means the variety among all living organisms, including the diversity within and between both wild and domesticated species, as well as the variety within the ecosystems in which these species live.

Agriculture and biodiversity

As a natural-resource-based industry, agriculture depends on a healthy diversity of the organisms and ecosystems that are its foundation. It is because of this close relationship that natural-resource-based industries such as agriculture have a direct impact on biodiversity.

The agriculture and agri-food sector is today faced with a number of pressures related to biodiversity that must be addressed to ensure the long-term sustainability of the industry. These pressures include

- the need to increase our knowledge of trends in the diversity of our agricultural genetic resources, through both on-farm and off-site conservation programs, and to appropriately address negative trends;
- the impact of alien invasive species (e.g., plum pox virus, leafy spurge, purple loosestrife) on both agricultural and natural biodiversity;
- possible impacts on biodiversity of new products (e.g., plants with new traits and pesticides);

Departmental targets:

1.3.1 On an ongoing basis, AAFC will undertake or fund research projects related to air quality, the ozone layer, and climate change to increase the understanding of factors affecting air quality, climate change, and their impact on agriculture.

Performance Measure: 1) Yearly number of related research projects undertaken or funded.

1.3.2 On an ongoing basis, AAFC will undertake or fund education and awareness initiatives to increase the adoption by producers of best practices or technologies that mitigate poor air quality, ozone depletion, or the agriculture's impact on climate change.

Performance Measure: Yearly number of related 1) communications activities; and 2) educational materials produced; 3) Estimate of number of producers reached.

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Performance Measure: Yearly number of related 1) policy-analysis reports; 2) agreements signed; and 3) programs developed and implemented.

Agri-environmental targets:

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Performance Measure: 1) Agricultural emissions of greenhouse gases; 2) Share of Canada's farmland accumulating soil organic carbon.

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Performance Measure: Will be developed and a baseline established by 2003.

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- the impact of alien invasive species (e.g., plum pox virus, leafy spurge, purple loosestrife) on both agricultural and natural biodiversity;
- possible impacts on biodiversity of new products (e.g., plants with new traits and pesticides);

- the need to address concerns regarding species and populations at risk, including rare breeds of livestock and heritage crops, as well as wildlife species such as the swift fox, burrowing owl, and sage grouse, which use agricultural lands as habitat; and
- the negative impact of over-abundant wildlife (e.g., snow geese, Canada geese) on agricultural and natural ecosystems.

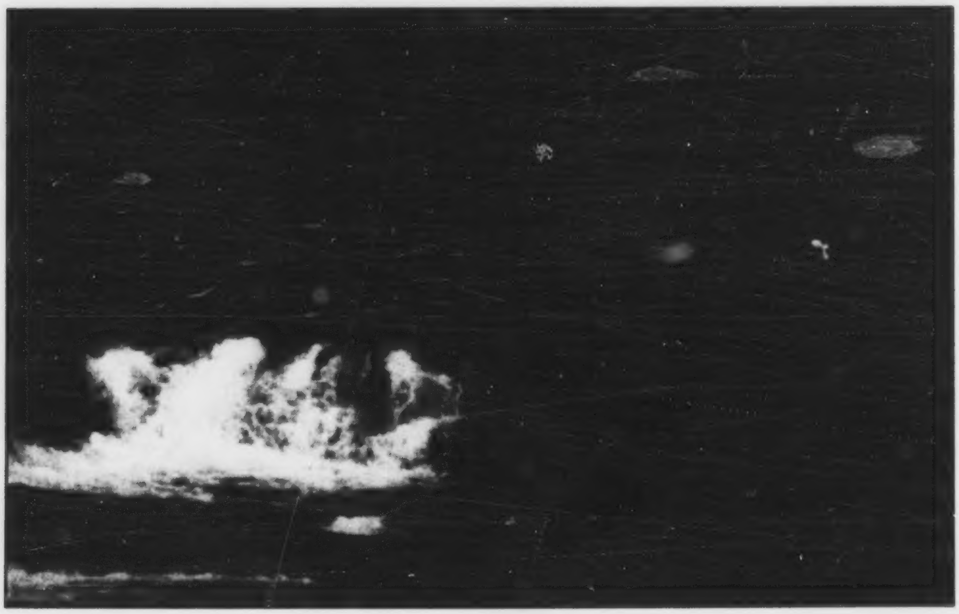
This section presents Agriculture and Agri-Food Canada's biodiversity strategy, developed in light of the pressures being exerted on biodiversity and the lessons learned from our first biodiversity action plan (*see* Annex A). Our new biodiversity strategy, along with ongoing activities noted in our earlier action plan, will make an important contribution to our goals of sustainable agriculture and sustainable development.

The United Nations Convention on Biological Diversity

Increasing awareness of the importance of biodiversity and concerns regarding significant losses in global biodiversity provided the impetus for many countries, including Canada, to become parties to the United Nations Convention on Biological Diversity.

The convention has three objectives: the conservation of biodiversity, the sustainable use of biological resources, and the fair and equitable sharing of the benefits resulting from the use of genetic resources.

The convention is the basis for many initiatives of significance to the agriculture and agri-food sector. At the international level, for example, the Biosafety Protocol aims to protect the environment by regulating the trans-border movement of living modified organisms, including agricultural seeds and plants. At the domestic level, the federal species-at-risk initiative, through an approach that balances stewardship, incentives, and prohibitions, aims to recover wildlife species at risk of extinction, some of which can be found on agricultural lands.



Objective 1.4:

Improve agricultural biodiversity

To ensure sustainable growth of the industry, Canada must continue to invest in agricultural research and development. Canada must also invest in initiatives to maintain a healthy diversity of the genetic resources, species, and ecosystems that are the industry's foundation. To do this, we must increase our knowledge and understanding of agricultural biodiversity and the importance of conserving it, and take steps to share this information with the sector.

Changing markets and increased demand for cost effectiveness have led farmers and ranchers to change the range of the crops and livestock they produce. The high value placed on uniformity, consistency, and predictability in the modern market place can sometimes lead to a reduction in agricultural genetic diversity, in turn increasing the risks associated with pests and pathogens. We must increase our knowledge of trends in the diversity of our agricultural genetic resources in order to assess the risk that limited genetic diversity may make agricultural products more vulnerable to pests and pathogens at the farm level, and also to develop appropriate conservation strategies. We are taking steps towards improving our knowledge of these trends, such as by examining records of farm animals registered under the *Animal Pedigree Act*, and by studying the diversity of seed samples stored in Canadian gene-bank collections.

All countries, including Canada, draw on the agricultural genetic resources of other countries to meet their changing needs. In recognition of this, and of the reality that Canada could never expect to conserve all of the agricultural genetic diversity that it would ever need, the federal government supports initiatives aimed at the conservation of, and access to, global agricultural genetic material. In this respect, Agriculture and Agri-Food Canada participates in a number of international initiatives, including the Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture, and the scientific and technical work of the International Plant Genetic Resources Institute.

The Convention on Biological Diversity requires the fair and equitable sharing of the benefits that result from the use of genetic resources, including appropriate access to genetic resources and transfer of relevant technologies. We have carried out studies to develop a more complete understanding of the range of benefits

State-of-the-art facility constructed for plant gene resources of Canada

In April 1998, Plant Gene Resources of Canada (PGRC) moved to a new facility in Saskatoon, Saskatchewan, built especially for the conservation and study of seed crop genetic resources. This was a significant move, since the major plant breeding programs for the seeds protected by the PGRC are located in western Canada.

PGRC holds the world-base collections of barley and oats and duplicate world collections of pearl millet and green manure crucifers. It also includes samples of the seeds from everything from alfalfa to zucchini, as well as wild relatives of the many plants we grow in Canada for food and pleasure. In all, the gene bank houses more than 110,000 samples of seed from Canada and around the world. The PGRC is also in the process of acquiring germplasm from our native plant species in an effort to contribute to the conservation of Canada's native genetic diversity.

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that could arise from the use of agricultural genetic resources and to identify potential mechanisms available for the equitable sharing of the benefits. Since benefit sharing could provide a powerful incentive for ensuring a healthy diversity of agricultural genetic resources in the future, Agriculture and Agri-Food Canada is committed to taking the lead for Canada in re-negotiating the International Undertaking on Plant Genetic Resources for Food and Agriculture under the United Nations Food and Agriculture Organization, an international agreement to conserve such genetic resources and enhance the benefits of using them.

Our Commitment

Agriculture and Agri-Food Canada will

- **continue to work with the sector and other stakeholders to increase the knowledge and understanding of agricultural biodiversity, and to demonstrate the importance of conserving this biodiversity;**
- **invest in research and development on crop plant genetic resources as an important step in the development of new crops and new uses for traditional crops, as well as in long-term research to increase our knowledge and understanding of the possible impact on agro-ecosystems of plants with new traits; and**
- **engage in education and awareness activities to improve the conservation, sustainable use, and enhancement of agricultural biodiversity.**

Departmental targets:

1.4.1 On an ongoing basis, AAFC will undertake or fund collaborative research projects to increase the state of knowledge of agricultural biodiversity in Canada; to develop new crops or crop germplasm, or new uses for traditional crops; and to examine possible impacts on agro-ecosystems of plants with new traits.

Performance Measure: 1) Yearly number of related research projects undertaken or funded.

1.4.2 On a regular basis, AAFC will undertake or fund communication initiatives to increase the sector's awareness of the status and importance of agricultural biodiversity in Canada.

Performance Measure: Yearly number of related 1) communication activities; and 2) documents published; and 3) Estimate of number of producers reached.

Agri-environmental targets:

1.4.3 By 2010, there will be an increase in the sector's knowledge and understanding of biodiversity and the importance of conserving it.

Performance Measure: Will be developed and a baseline established by 2003.

1.4.4 By 2010, there will be an improvement in the conservation, sustainable use, and enhancement of agricultural biodiversity.

Performance Measure: Will be developed and a baseline established by 2003.

See Annex C for details on baselines for agri-environmental measures.

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Performance Measure: Will be developed and a baseline established by 2003.

1.4.4 By 2010, there will be an improvement in the conservation, sustainable use, and enhancement of agricultural biodiversity.

Performance Measure: Will be developed and a baseline established by 2003.

See Annex C for details on baselines for agri-environmental measures.

Objective 1.5:

Improve the conservation of natural biodiversity

Natural biodiversity, and the ecosystem services it provides — from the soil micro-organisms involved in nitrogen fixation, to the earthworms that help break down organic matter, and the pollinators needed for plant reproduction — makes an essential contribution to agricultural production. The sustainability of our agriculture and agri-food sector depends upon the conservation of this natural biodiversity.

As important as natural biodiversity is, our scientists estimate that only about half the wild species thought to exist in Canada have been named, and only about one percent have been adequately studied. Furthermore, public opinion surveys have shown that there is confusion among the Canadian public about issues related to biodiversity.

Farmers, ranchers, and stewardship

The Restoration of the American Chestnut — Farm Response to a Species at Risk project demonstrates a cooperative and effective approach to restoring the American chestnut tree, a species at risk. Led by a provincial farm organization, the Ontario Soil and Crop Improvement Association, this initiative involved farm groups, landowners, environmental wildlife organizations, and government agencies. Through this project, chestnut trees were planted on farms across southern Ontario during the spring and fall of 1999. The plantings were designed to enhance diversity on the farm and serve specific functions desired and valued by the landowners.

Another species at risk that benefits from the sector's stewardship efforts is the swift fox, a prairie grassland species whose population was reduced to the point that, by 1978, it was no longer found in the wild in Canada. Ranchers in southern Alberta and Saskatchewan have contributed to the re-introduction of the swift fox by permitting the release of these foxes onto their rangelands. Their voluntary actions have helped to improve its status, so that today almost 300 swift foxes are estimated to exist in the wild in Canada, the majority on native rangelands near the Alberta/Saskatchewan–U.S. border.

There is a role for Agriculture and Agri-Food Canada to play in providing information to the sector and other stakeholders to increase their understanding and awareness of biodiversity of significance to agriculture and to the natural world, and of the importance of conserving it.

Farmers and ranchers are key custodians or stewards of biodiversity. Their ongoing stewardship initiatives, including practices such as rotational grazing, planting shelterbelts, providing nesting boxes or natural shelter for wildlife, and managing riparian areas, play an important role in improving and enhancing natural biodiversity.

Survey of attitudes and behaviours regarding land stewardship

A survey of almost 1500 farmers, ranchers, and rural landowners, carried out in the spring of 2000, confirmed that confusion exists regarding natural biodiversity. The survey found that, though landowners are generally concerned about wildlife, there are gaps in their knowledge of the wildlife that exists in their area, and many are uncertain as to the changes they might make in order to benefit wildlife.

However, the conservation and enhancement of wildlife habitat, particularly to recover species at risk of extinction, benefits all Canadians. The agricultural sector should not be expected to bear an unfair burden of the cost of related activities. Therefore, as well as developing programming to inform and encourage the sector to conserve and enhance natural biodiversity, we must lead by example by participating in strategies to address natural biodiversity, including the recovery of species at risk, on lands that we administer. We must also encourage and recognize the stewardship initiatives of the sector and take steps to make sure that the Canadian public is also aware of the sector's stewardship efforts. Finally, to ensure the continuation of this stewardship ethic, the impact of overabundant wildlife on agricultural production must also be adequately addressed.

Our commitment

Agriculture and Agri-Food Canada will

- **work collaboratively with the sector, other federal departments and agencies, provincial governments, and other stakeholders to improve the conservation, sustainable use, and enhancement of natural biodiversity, particularly within Canada's agro-ecosystems;**
- **provide leadership in strengthening Canada's biodiversity science and networking capacity, and in increasing the knowledge, understanding, and awareness of biodiversity of significance to agriculture and to the natural world, and the importance of conserving it; and**
- **take steps to ensure that the information and knowledge gained about natural biodiversity is provided to the sector and to the general public.**

Departmental targets:

1.5.1 On an ongoing basis, AAFC will undertake or fund collaborative research projects to increase the knowledge and understanding of natural biodiversity, and the importance of conserving it.

Performance Measure: 1) Yearly number of related research projects undertaken or funded.

1.5.2 Starting in 2001, AAFC will provide leadership for the development, in collaboration with partners, of an electronically accessible national database network of biodiversity information.

Performance Measure: 1) Strategy for the development of the database is prepared, and various stages of implementation are in place.

1.5.3 On an ongoing basis, AAFC will undertake or fund education and awareness initiatives to communicate the importance of natural biodiversity. It will also recognize and award farmers' and ranchers' exemplary stewardship practices that benefit natural biodiversity.

Performance Measure: Number of 1) stewardship recognition awards delivered; 2) related communications activities; and 3) documents published; 4) Estimate of number of producers reached.

1.5.4 On an ongoing basis, AAFC will contribute to biodiversity conservation and enhancement on lands it administers.

Performance Measure: 1) Number of bio-physical inventories on AAFC pastures, completed annually; 2) Percentage of native land on AAFC pastures in "good to excellent" range condition classes; 3) Number of cooperative conservation projects on AAFC pastures, including wildlife management plans and recovery projects, for listed wildlife species at risk.

Agri-environmental targets:

1.5.5 By 2006, there will be an increase in farmers' and ranchers' knowledge and awareness of natural biodiversity and in the stewardship initiatives they carry out that benefit natural biodiversity.

Performance Measure: 1) Follow-up survey of farmers and ranchers indicating a measured increase in knowledge, awareness, and stewardship initiatives carried out.

1.5.6 By 2006, there will be a neutral or positive trend in habitat availability on agricultural lands across Canada.

Performance Measure: 1) Share of habitat-use units associated with agricultural land for which habitat area increased or remains constant.

See Annex C for details on baselines for agri-environmental measures.

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Strategic Direction 2

Prosperous

[illegible] in a Sustainable Manner

Improving the sector's environmental performance requires investment. Developing and introducing eco-efficient practices offers great investment potential. The sector can benefit from improving the eco-efficiency of their activities through increased productivity, reduced costs, and better environmental performance.

The high quality of Canada's agricultural food products and our commitment to environmental protection have contributed to the successful marketing of Canadian products in both domestic and export markets. The agriculture and agri-food sector could capitalize further on this opportunity and contribute to achieving economic sustainability by differentiating and commercializing Canadian products on the basis of environmentally sustainable production. As well as unique products, the sector could market technologies and expertise with demonstrated environmental benefits.

Differentiating Canadian agricultural products in this manner requires the rethinking of marketing strategies. The opportunity exists to create market niches for non-traditional foods (e.g., functional foods and nutraceuticals) produced in an environmentally sustainable manner (i.e., using specific farm practices) and foods with desirable features (e.g., gluten-free wheat). Another emerging opportunity for the sector is the life science economy. Through the innovative use of products and by-products from agriculture and food processing, life sciences offer the potential for economic, as well as environmental, benefits for the sector and society in general. The processing of by-products of lower quality or those that have traditionally not garnered favourable returns can, in some instances, create a product of economic value (e.g., straw particle board) and improve the sector's competitive position.

For agricultural products produced in an environmentally sustainable manner to be successful in the marketplace, consumers must see sustainability as an attribute they can choose. Producers and processors must also be aware of the benefits of eco-efficient practices, as well as of the market opportunities for these products. Communicating both is essential to the success of this new marketing opportunity.

Objective 2.1:

Improve productivity through eco-efficiency

The concept of eco-efficiency can be broadly defined as the production, delivery, and use of competitively priced goods and services that satisfy human needs and enhance the quality of life, while progressively reducing ecological impacts, resource use, and pollution intensity throughout the product life cycle. Inherent in this concept is the integration of economic and environmental factors in business decision-making.

Agriculture uses many inputs in the production process, including capital, labour, machinery, land, water, nutrients, pesticides, and energy. These inputs represent a significant proportion of overall farm operating costs, and using them inefficiently can result in economic loss for producers and impose environmental costs on society. The high market cost of inputs creates an incentive to use them cost-effectively. However, inefficiencies can still occur when the cost of inputs to producers is less than the full non-market costs (social and environmental) of their use. For example, a certain level of pesticide use may be cost-effective for the producer, but may pose a cost to society in terms of its contribution to declining water quality.

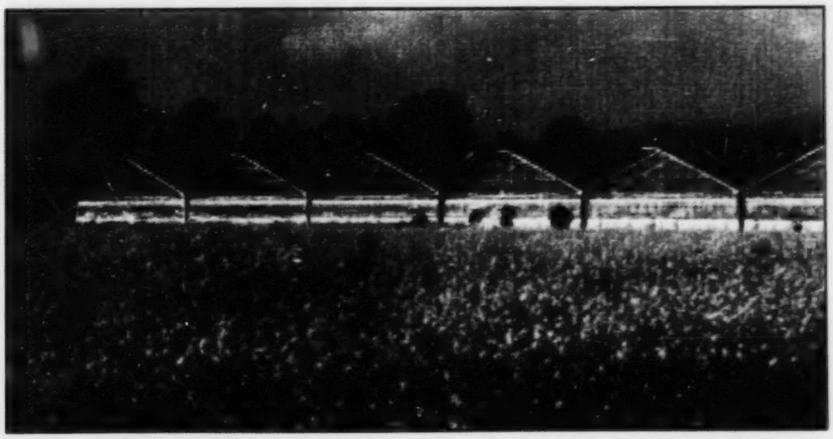
The concept of eco-efficiency is relatively new. Faced with competing priorities and financial pressures, the sector needs help to understand this concept and to explore ways to integrate it into their practices, on the farm and in the business office. We can help to further this process by providing information that helps to

- identify cost-effective environmental opportunities and encourage understanding and adoption of eco-efficient practices in agriculture;
- assess the availability and usefulness of eco-efficient management systems, such as nutrient management planning; and
- capitalize on domestic and international demands for products produced eco-efficiently.

Eco-efficiency is a win-win proposition

Eco-efficiency is recognized by the Government of Canada as a key mechanism for industry to contribute to sustainable development. The House of Commons Standing Committee on Industry recently described eco-efficiency as an important business practice and management tool, whereby innovations in technology, production, processes, product design, and business organization and practices can lead to lower unit costs, improved product quality, lower environmentally related liability, less material usage, and less adverse effect on the environment.

There is also a role for government in supporting the adoption of modern business management approaches that ease the integration of environmental factors into an organizations overall management plan (e.g., environmental management systems such as ISO 14000, or environmental labeling). Another approach to improving eco-efficiency is life-cycle assessment. Using this tool, organizations go beyond their own operational boundaries and work with suppliers to improve the overall environmental performance of the full life-cycle of their products (e.g., raw materials, manufacturing, use, and end-of-life), enhance product quality, and, potentially, reduce costs. In addition to helping business meet both environmental and economic goals, these tools can increase public confidence, credibility, and market recognition. Other opportunities may arise when innovations from other sectors are applied to the agriculture and agri-food sector, or vice versa.



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Our commitment

Agriculture and Agri-Food Canada, in partnership with other departments, the agriculture and agri-food sector, and other stakeholders, will work

- **to increase the understanding and awareness of eco-efficiency; and**
- **to encourage the development and adoption of eco-efficiency management tools, technologies, and practices.**

Departmental targets:

2.1.1 On an ongoing basis, AAFC will undertake or fund research projects aimed at increasing input efficiency in the agriculture and agri-food sector.

Performance Measure: 1) Yearly number of related projects undertaken or funded (new or ongoing).

2.1.2 By March 31, 2004, AAFC will have completed or funded at least three education and awareness initiatives aimed at increasing the agriculture and agri-food sector's understanding of eco-efficient practices.

Performance Measure: 1) Yearly number of education and awareness initiatives completed;
2) Estimate of number of persons reached.

2.1.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options to further the understanding and adoption of eco-efficient production and processing practices.

Performance Measure: Yearly number of related 1) policy-analysis reports (including modeling);
2) agreements signed; and 3) programs developed and implemented.

Agri-economic targets:

2.1.4 By 2006, there will be an increase in the ratio of agricultural output energy over input energy.

Performance Measure: 1) Ratio of energy output/energy input in agricultural systems; 2) Chemical use intensity (to be developed).

2.1.5 By 2006, the Canadian primary agriculture sector will demonstrate growth in productivity that equals or exceeds that of other key producing nations or regions with temperate climates.

Performance Measure: 1) Annual multi-country productivity measurement.

See Annex C for details on baselines for agri-economic measure.

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Objective 2.2:

Improve investment, market access, and market development for agriculture and agri-food products, technologies, and knowledge that contribute to sustainable agriculture

Growing public concern over the state of our environment has been reflected in existing or pending domestic and international regulations and protocols. Many producers are finding economic opportunities through the production of traditional or non-traditional foods in a more environmentally sustainable manner. Others are beginning to exploit new niche markets by producing agriculturally based non-food products (such as renewable energy, chemicals, pharmaceuticals, plastics, building materials, and health care and medicinal products) using renewable agricultural materials.

Investment

Investment is a key requirement for successful sustainable development. Attracting funds from domestic and international sources, along with the technologies, skills, and market linkages these sources bring with them, is critical for the development, production, and marketing of new products and techniques.

Because funds can flow to any industry or country where investment opportunities exist, a competitive business climate is critical for attracting these funds. For example, Canadian regulatory approvals (e.g., the acceptance of fibreboard for building standards, health claims for food products, etc.) for new products or processes must be timely or they may be developed and produced in the larger U.S. market. Canada must have a business climate comparable to that of the United States and other competitor countries, such as the European Union nations, which includes measures like direct support and favourable tax regimes.

Creation of investor interest in food and agriculture-based non-food products produced in a sustainable manner, and in technologies related to this production, requires that investors

- feel comfortable with the industry (i.e., have a degree of understanding of the markets and the products);
- know the opportunities (i.e., have information on the timeliness and profitability of projects); and
- see opportunities comparable, in terms of risk and return, to those available for alternative investment.

Market access

Maintaining and improving market access for Canadian agricultural products are important for the economic growth of the sector. We can help to open market doors for these products by

- reducing and resolving barriers to domestic and international trade;
- negotiating new trade agreements;
- developing fair rules affecting trade, to provide a secure domestic and international marketplace for Canadian products, and ensuring the implementation of these rules by other countries;
- promoting rules based on sound science, particularly where environmental concerns are relevant;
- advancing Canada's interest through the activities of international bodies; and
- providing advice on Canada's trade rights and obligations to Canadian industry and policy makers.

Market Development

The Canadian Agricultural Marketing Council has set an export goal of a four-percent share of the world's agriculture and agri-food trade and an increase in the contribution of value-added exports from 40 percent (in 1995) to 60 percent by 2005. To support the sector's efforts to achieve these goals the Team Canada approach will be used in promoting Canada as a reliable supplier of high-quality products produced in a safe and environmentally sustainable manner. Canadian products will be promoted in the global marketplace through targeted-priority and emerging-country strategies and their related activities (such as trade shows, incoming and outgoing missions, timely market information, seminars, and conferences).

A growing volume of Canada's national product comes from economic activity generated by the life science economy (based on new and alternative products and services derived from, or related to renewable biological material). A number of economic opportunities exist in the domestic and export markets for such products, which include

- conventional foods (e.g., foods with enhanced taste, nutrition, or product-life);
- novel and functional foods;
- nutraceuticals;
- bio-energy, bio-health, and bio-materials; and
- environmental protection and remedial measures.

Our commitment

Agriculture and Agri-Food Canada will

- **assist the sector to achieve a favourable business climate by helping them integrate sustainable development principles into their investment strategies, providing analysis of the sustainable-development business climates of selected nations, and addressing barriers to trade; and**
- **work to find the right place in the market for products, technologies, and knowledge that contribute to a sustainable agriculture through the development of information, the communication of opportunities to both domestic and foreign investors, and the promotion of the life science economy.**

Departmental targets:

2.2.1 On an ongoing basis, AAFC will prepare and disseminate information materials on identified international market opportunities for Canadian food and non-food products, practices, and technologies that contribute to sustainable agriculture.

Performance Measure: Yearly number of related 1) awareness initiatives completed; and 2) communications materials completed; 3) Estimate of number of persons reached.

2.2.2 Starting in 2001, AAFC will undertake at least one national and one international promotion initiative each year related to sustainable Canadian food and non-food products, technologies, and/or knowledge.

Performance Measure: Yearly number of 1) related promotion initiatives; 2) investors reached.

2.2.3 On an ongoing basis, AAFC will maintain and improve market access for Canadian agriculture and agri-food products.

Performance Measure: 1) Yearly report on significant market-access results.

2.2.4 On an ongoing basis, AAFC will promote awareness of, as well as retain and attract increased investment in, the life science sector, including new environmentally sustainable technologies, products, and processes.

Performance Measure: Yearly number of 1) opportunities identified; and 2) investments attracted.

Agri-economic targets:

2.2.5 By 2005, there will be an increase in the Canadian share of the world's agriculture and agri-food trade to four percent, and of the contribution of Canadian value-added exports to 60 percent.

Performance Measure: 1) Canadian share of the world's agriculture and agri-food trade; 2) Contribution of Canadian value-added exports.

2.2.6 By 2004, there will be an increase in investment in value-added agricultural products.

Performance Measure: Will be developed and a baseline established by 2003.

See Annex C for details on baselines for agri-economic measures.

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Strategic Direction 3

Contribution

The face of Canadian communities is changing. In some places, particularly around urban centres, traditional farming communities are becoming more diverse, as new residents and businesses move in, bringing with them needs and desires different from those of long-standing community members. In other regions, generally further from urban centres, the challenge is to adjust to modern social and economic pressures that sometimes bring into question the very existence of these communities in the future.

Sustainable agriculture and Aboriginal communities

Recent numbers from Statistics Canada indicate that 20 percent of Aboriginal people live in rural non-reserve locations and share the challenges of rural communities.

Aboriginal farm operations are, in general, diverse but relatively small, making it difficult to support a family solely on farm income (the same is true for most small-scale Canadian farms). The Aboriginal Agriculture and Agri-Food Conference, organized by the Native Investment and Trade Association in British Columbia in 2000, encouraged more Aboriginal participation in agriculture. An issue scan revealed interest in areas such as organic farming and greenhouse vegetable production. However, there are barriers to the development of Aboriginal agriculture. Some barriers, such as the difficulty of entering the global market and the high level of skill and technology needed on farms today, are common to all farms. Others, such as historical limitations and lack of agricultural training, may be unique to Aboriginal farming.

It is within AAFC's mandate to invest in people and strengthen economic development. We will continue to improve economic opportunities in Aboriginal communities as part of our rural development approach.

Community-level issues can influence on-farm management. The public's expectation for clean water and wholesome food, free of potential contaminants like pesticides and bacteria, influences the way a farmer farms. Competing land use gives rise to conflicts, in some cases resulting in the siting of agricultural operations further from residential and urban fringe areas. As economic conditions change, the traditional family farm faces a growing struggle to compete. As a result, Canadian farmers are now relying more on off-farm income and doing a smaller share of their buying and selling locally. Farms are becoming bigger and more mechanized, and require less labour to run them.

Most Canadian communities can survive under today's changing conditions if they have the capacity to determine their own futures and a healthy physical environment on which to build their plans. Supporting sustainable communities — providing the information they need and giving them full access to government services — is a priority for the federal government.

Our department is committed to providing information on agro-environmental issues so that Canadians have the knowledge to make sound decisions and resolve issues. Another concern is to maintain a high level of consumer confidence in the quality, safety, and production of Canadian food. Policies and programs that support these priorities include

- developing and promoting best risk-management tools, practices, and techniques for food safety and environmental health;

- monitoring major risk factors affecting the agri-food sector; and
- providing the government support programs needed for the agriculture and agri-food sector to be able to manage the risks associated with financing, markets, health, and the environment.

Objective 3.1:

Reduce risk in pest management

The control of pests and diseases is fundamental to the production of safe, high-quality, and abundant agricultural products for Canadians. A sustainable development approach minimizes the risks of harm to the environment and human health from pest management practices.

Pest control products

The *1999 Report of the Commissioner of the Environment and Sustainable Development* (CESD) addressed the assessment and management of toxic substances within the federal government and made a number of recommendations, primarily to improve coordination, cooperation, and consistency among departments and agencies. Chapter 4 of the *Government Response to the CESD Report*, "Managing the Risks of Toxic Substances: Obstacles to Progress," commits departments, including Agriculture and Agri-Food Canada, to table their implementation plans for the federal Toxic Substances Management Policy (*see* Box) by December 2000.

Toxic Substances Management Policy

The federal government's Toxic Substances Management Policy (TSMP), released in 1995, outlines a framework for the management of toxic substances in Canada. Agriculture and Agri-Food Canada and the Canadian Food Inspection Agency view the TSMP as a general guide for federal government departments that emphasizes the concepts of risk and precaution in assessing and managing toxic substances.

The policy has two key objectives: 1) virtual elimination from the environment of toxic substances that result predominantly from human activity and that are persistent and bioaccumulative (Track 1); and 2) management of other toxic substances and substances of concern throughout their entire life cycles, to prevent or minimize their release into the environment (Track 2).

TSMP also sets out selection criteria for Track 1 substances with respect to persistence and bioaccumulation values. For the purpose of the TSMP, a substance is considered toxic, as per the *Canadian Environmental Protection Act*, if it is entering or may enter the environment in a quantity or concentration or under conditions

- having or that may have an immediate or long-term harmful effect on the environment;
- constituting or that may constitute a danger to the environment on which human life depends; or
- constituting or that may constitute a danger in Canada to human life or health.

The federal government will target substances that meet all four criteria (toxic, persistent, bioaccumulative, and predominately anthropogenic) for virtual elimination from the environment.

We contribute significantly to the non-regulatory aspects of pesticide management. Through research and development, technology transfer, awareness activities, and adaptation support, we develop and promote products and practices that help ensure the safety of humans and the environment. Our pesticide research includes

- identifying pesticides that are more selective, less persistent, and less toxic;
- developing improved methods for applying pesticides; and
- developing new crop varieties that are resistant to pests and diseases.

Integrated Pest Management

Integrated Pest Management (IPM) is a strategy of pest control that uses a combination of crop rotations, cultivation, and biological and chemical pest controls. The main environmental benefit of IPM stems from the reduced reliance on synthetic chemical pesticides by incorporating non-chemical techniques into the pesticide management system. The goal of IPM is to keep pest population densities low enough to prevent economic damage while preserving natural predators and parasites and other beneficial organisms.

Research into the development of new pest-control products must continue to be a priority as new pest problems arise, knowledge of new registrations in other countries evolves, or in response to impending deregistrations. Re-evaluation activities related to the Canadian *Pest Control Products Act* and the U.S. *Food Quality Protection Act*, including a review of existing registered pesticides, are hastening the development of reduced-risk pest management products and systems. For example, organophosphate-based pesticides replaced organochlorine-based pesticides because of environmental and human health concerns. However, organophosphate-based pesticides are currently being reviewed by the United States, and Canada is doing the same. Work is needed in developing the next generation of pesticides. Because the United States is Canada's largest trading partner, there is a need for the two countries to harmonize their activities to ensure that safer new products are developed and registered for use in the control of pests and diseases.

Pest management strategies

There are a number of approaches to pest management, including chemical controls, biological controls, integrated pest management (IPM) systems (*see* Box), biotechnological development of resistant varieties, and organic agriculture. Many of these are closely related and can be variously combined in agriculture to maintain control of pests and diseases while minimizing the use of toxic substances.

Science and experience show that effective pest management can combine cost-effective integrated pest management technologies (including safer new pesticides that reduce or replace many of the more harmful pesticides) with technologies currently in use.

Better land-management practices can reduce the likelihood of farmlands being a source of pests and disease. For example, tillage and crop rotation can address these problems, while reducing the total cost of agro-chemical use. Other best management practices include those that focus on reduced application and loss of farm chemicals while promoting water conservation. We support integrated pest management through research on

- resistant crop varieties;
- cultural practices (e.g., mechanical practices, crop rotations, crop timing, trap cropping);
- the use of new chemical or physical pest-control compounds that fit into IPM; and
- biological controls (i.e., the introduction of pest parasites and predators or selections of native parasites and predators).

Biotechnology is a tool that can help reduce the risk of harm to the environment and human health from the use of agricultural chemicals. For example, disease- and pest-resistant crop varieties developed with biotechnology can reduce the need for pesticides. However, biotechnology is a public concern, particularly in its food-related applications. Rigorous scientific assessment, responsive risk management, and objective communication of potential effects of biotechnological products on human health and the environment are essential to addressing public concerns effectively. We can support the safe application of biotechnology in the agriculture and agri-food sector through sound science, producer and consumer awareness initiatives, technology transfer, and market development.

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Organic farming is another way to reduce the use of synthetic chemicals in food production, as well as to improve soil quality and protect the environment and human health. Organic farming does not use synthetic chemicals or genetically modified organisms during crop and animal production, nor irradiation during food processing. Pest control is achieved by using natural biological methods. The recent increase in consumer demand for organic products provides an opportunity to hasten the development of organic agricultural practices as a cost-effective alternative for agricultural producers to control pests and diseases. The organic farming sector has developed a certification system that will help promote product recognition and consistency.

Our commitment

Agriculture and Agri-Food Canada will

- **work with the sector and other stakeholders to reduce the risk from pest management;**
- **support research and development activities to develop reduced-risk pest-control products and management practices, and to increase our understanding of pest control in agriculture;**
- **engage in education and awareness activities to promote integrated pesticide management and best practices and to demonstrate their effectiveness to the sector; and**
- **evaluate policy options that could enhance the sector's capacity to facilitate the introduction of reduced-risk pest-control products.**

Departmental targets:

3.1.1 On an ongoing basis, AAFC will undertake or fund research projects related to integrated pest management to further the understanding of ways to reduce our reliance on pesticides.

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Performance Measure: Yearly number of related 1) communication activities; and 2) materials produced; 3) Estimate of number of persons reached.

3.1.3 On an ongoing basis, AAFC will play an active policy role with partners to facilitate the introduction, and improve the availability, of reduced-risk pest-control products to the sector.

Performance Measure: Yearly number of related 1) policy-analysis reports; 2) agreements signed; and 3) programs developed and implemented.

Agri-social targets:

3.1.4 By 2006, there will be an increasing trend in the adoption by producers of integrated pest management and of best management agricultural practices or technologies that reduce the risk associated with pest management.

Performance Measure: Management of farm pesticide input, four sub-indicators: 1) Timing of herbicide application; 2) Timing of insecticide and fungicide application; 3) Sprayer calibration; 4) Use of non-chemical pest-control method.

See Annex C for details on baselines for agri-social measures.

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The livestock industry

One example of taking good neighbourliness seriously is livestock producers' efforts in recent years to improve their relationships with local communities. The intensification of livestock production has been problematic for many rural communities, causing controversy in specific areas across the country. To deal with issues such as water quality, odour, and nuisance, various producer organizations are working with partners in government, universities, and local communities to explore innovative solutions to these concerns. For example, researchers are finding ways to reduce odour from manure through changes in feed composition and the use of straw bedding. They are also investigating alternatives for better manure storage, such as covered lagoons. Working closely with farmers ensures that these changes are practicable and cost effective.

Information for sustainable land resource management

The assessment and evaluation of national agricultural production activities and their environmental impacts rely to a considerable extent on incomplete and cartographically diverse databases. For example, soil and land use maps are based on extrapolating detailed descriptions of sample sites to larger areas. Much of the available data was collected at different time periods, using different methods, purposes, and scale.

For current and impending environmental and trade issues, there is virtually no data available. AAFC works with its partners to identify and collect new data using technologies such as remote sensing; develop and apply environmental and production process mathematical models; interpret the results of modelling and data analysis; etc.

The federal government will invest in advanced information systems to enable better land use and protect surface and ground water supplies from the impact of agricultural operations.

Objective 3.2:

Encourage informed public dialogue on agri-environmental issues

The presence of larger farm operations next to more socially diverse rural or semi-rural communities creates another set of expectations and pressures. Long-term community residents sometimes dismiss the resulting tensions as the traditional friction between rural and urban dwellers, but the reality is more complex. Larger farm operations may generate substantial heavy traffic, dust, noise, and odour. These pollutants pose a risk to human health and well-being, particularly to that of children and people with other health concerns.

Farmers are adopting new methods and management practices to alleviate these problems and are also learning to work closely with their local communities when planning to build a new operation or expand an existing one. Community meetings and conflict resolution can help to resolve issues by, for example, influencing the siting of a barn away from residential areas. Municipal leaders are also becoming more informed on how to work with the community to draft effective by-laws to promote economic growth, protect the environment, and foster harmonious relationships within the community.

Provincial and federal levels of government are also consulting with Canadians on agri-environmental issues, including one that is crucial to public health — water quality. Communities are increasingly concerned about the entry of crop nutrients, toxic chemicals, and pathogens from agricultural activities into drinking water, and farmers share this concern. Farmers need information on ways to managing their operations to eliminate or minimize the risk of contributing to declining water quality. Researchers are developing and refining best management practices to protect water resources, but it is equally important to transfer these practices and technologies to the farming community.

Designing and implementing effective policies, programs, and information are important in fostering effective decision making on agri-environmental issues that affect all Canadians. As fewer Canadians are raised on or around farms, continued efforts will be needed to raise the awareness of Canadians in urban and rural communities about the challenges facing modern farming and the efforts being made by the sector to ensure a safe, healthy environment.

Our commitment

Agriculture and Agri-Food Canada will

- **work with the sector and other stakeholders to provide information and knowledge for informed land management decision-making; and**
- **provide information on the sector's progress towards sustainable agriculture and agri-food production, and communicate with Canadians to identify and address their concerns related to intensive agricultural production.**

Departmental targets:

3.2.1 On an ongoing basis, AAFC will develop and produce information and tools for communities, the sector, or the public, so they can make informed land-management decisions that may affect the sustainability of natural resources.

Performance Measure: 1) Yearly number of information tools, databases, or information materials made publicly available; 2) Estimate of the use of these tools.

3.2.2 On a regular basis, AAFC will report on agriculture's progress towards improving environmental performance, and will identify areas that remain at risk.

Performance Measure: 1) Publication of specialized reports (e.g., updates on agri-environmental indicators).

3.2.3 On an ongoing basis, AAFC will communicate or consult with Canadians to better inform them on the production of Canadian food and to identify and address their concerns related to intensive agricultural production.

Performance Measure: Yearly number of related 1) communications materials produced; and 2) consultation activities or initiatives undertaken or funded.

Agri-social targets:

3.2.4 The frequency and significance of agriculture-related environmental issues will diminish.

Performance Measure: 1) Yearly report from media scans and public opinion surveys.

See Annex C for details on baselines for agri-social measures.

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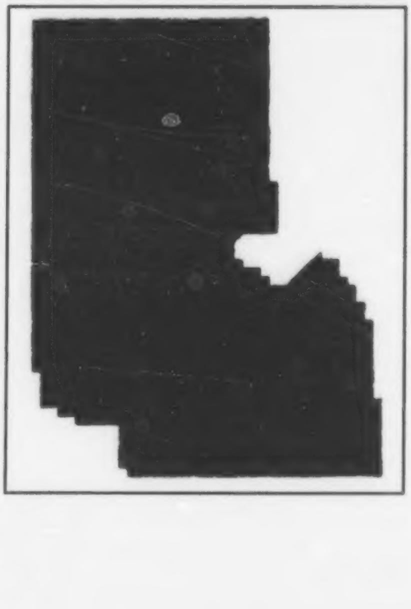


Objective 3.3:

Develop healthy innovative products

Agriculture and Agri-Food Canada, along with government, industry, and research partners, has an important role to play in developing a functional food and nutraceutical industry in Canada. This industry will create new products and jobs, serve growing domestic and foreign markets, and have a positive impact on human health, all in a manner that respects the environment.

A fair regulatory environment for the domestic market is needed to encourage the development and commercialization of products, processes, technologies, and services, which will give Canada a competitive edge in the new technology-based economy. Cooperative research will support the development and refinement of these innovations, fostering economic growth through continued market diversification and sales of value-added products. Environmental issues can be addressed by, for example, incorporating best management practices into the development of these innovative products.

At the same time, the regulatory environment must continue to protect consumers and the environment and contribute to the best quality of life for all Canadians. As interest in functional foods and nutraceuticals grows, consumers and health professionals require more information on the health benefits of these products. We have a role to play in developing ways of transmitting information to consumers that are clear and credible, fostering a high level of consumer confidence in the quality, safety, and efficacy of the Canadian food supply. We can also provide information to manufacturers on effective ways to promote and market their products.

Our Commitment

Agriculture and Agri-Food Canada will work with its partners and other stakeholders

- **to position Canada as a world leader and centre of excellence in the research, production, and marketing of innovative, safe, high-quality, environmentally friendly, and efficacious functional foods and nutraceuticals; and**
- **to facilitate consumer access to a wide range of products with potential health benefits.**

Departmental targets:

3.3.1 AAFC will undertake and/or support collaborative research that supports crop and product development and health claims, and enables technology transfer and scale-up leading to commercial products.

Performance Measure: 1) Yearly number of collaborative research activities undertaken or supported.

3.3.2 AAFC will undertake and/or support initiatives to facilitate development of regulations conducive to growth and competitiveness in the functional food/nutraceutical sector.

Performance Measures: 1) Successful completion of a study on the business and market impacts of Canadian legislation and regulations; 2) Yearly number of fora in which such studies have been brought to the attention of policy-makers; 3) Yearly number of successful initiatives to raise awareness among regulators of technologies on the horizon that will require responsive, forward-thinking regulatory development.

3.3.3 AAFC will undertake and/or support initiatives to facilitate domestic and foreign investment in the functional food/nutraceutical sector, and in Canada's share of global markets for these products.

Performance Measures: Yearly number of successful 1) investment activities; and 2) international marketing/trade-promotion activities.

3.3.4 AAFC will undertake and/or support initiatives to raise Canadians' awareness of the potential for functional foods/nutraceuticals to improve health, and of the role of public research and technologies; and producers' awareness of market opportunities and tools to take advantage of them.

Performance Measures: Yearly number of related 1) communications materials produced or supported; and 2) consultation activities undertaken or supported; 3) Estimate of number of people being reached.

Agri-economic and agri-social targets:

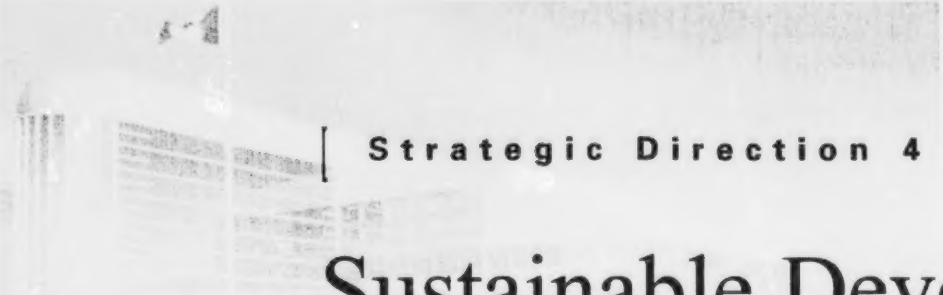
3.3.5 By 2006, there will be significant increases in investment in the functional food/nutraceutical sector in Canada, and in Canada's share of global markets.

Performance Measure: 1) Number and magnitude of new investments in the functional food/nutraceutical industry; 2) Canada's share of global markets.

3.3.6 By 2006, there will be an increase in how well-informed the public and agri-food community are about the potential for functional foods/nutraceuticals to improve health and contribute to a dynamic economy.

Performance Measures: 1) Consumer and health-professional surveys; 2) Value-chain success stories.

See Annex C for details on baselines for agri-economic and agri-social measures.



Strategic Direction 4

Sustainable Development

Private sector and public organizations are under growing pressure to operate in an environmentally sound way. Increasingly stringent environmental legislation and development of policies and other measures to protect the environment contribute to this pressure. Public expectations have also influenced this change. As a result, organizations of all kinds are becoming more concerned about how to control the impact of their activities, products, and services on the environment.

As the single largest organization in Canada, the federal government can set an excellent example for Canada in its own practices. It contributes to the legal framework in which Canadians use the environment and touches a large number of people through its programs and services. It is also the country's single largest employer, purchaser, and landlord. In short, the government exerts enormous influence on the country's goals, values, and actions.

As a part of the federal government, Agriculture and Agri-Food Canada shares this role. Part of our responsibility lies in helping the agriculture and agri-food sector adopt sustainable ways of doing business, but we are also responsible for conducting our own affairs sustainably. This section looks at how we intend to further integrate sustainable development principles into the development of our policies and programs, and to green our own operations.

A) Sustainable development in policies and programs

Sustainable development means that decision-makers consider environmental, social, and economic factors systematically when deciding what to do and how to do it. Informed decision-making examines all sides of an issue, weighs the pros and cons, and strikes a balance. Like all federal government departments, we are now striving to find this balance — to take the principles outlined in our first sustainable development strategy and turn them into further action. This is not an easy task. It involves a new way of thinking about our policies, programs, and operations.

Objective 4.1:

Integrate sustainable development principles into policy and program development

Sustainable development is not a fixed state that can be achieved with a one-time effort. It is a dynamic state of continuous improvement. To ensure that we are progressing in our efforts to integrate sustainable development into departmental decision-making, we have identified three areas for attention: improving the tools available for sustainable development analysis, defining a process for sustainable development analysis, and improving the outputs of sustainable development analysis.

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Tools

To integrate sustainable development into departmental decision-making, the people researching, advising on, and making the decisions must understand what sustainable development means, within both our department and the federal government. We must provide them with the tools to do this work.

Process

Sustainable development principles are intended to guide action, not inhibit it. Departmental policy analysts must include sustainable development in their policy advice in the same way that they include other important aspects such as scientific recommendations or rural considerations. We review policies, programs, and legislation under three circumstances: when an initiative is new or under review, when an initiative may give rise to acute environmental problems, and when significant public concern has been expressed regarding the program. The same criteria could be applied to reviewing initiatives for sustainable development.

Outputs

Improvements in the tools for sustainable development analysis and the process to make it happen will ultimately lead to better policy advice for decision-makers. Documenting the analytical process and reviewing its effectiveness also help to ensure that these activities work in favour of, not against, sustainable development in the agricultural and agri-food sector and across the country as a whole.

Our commitment

Agriculture and Agri-Food Canada will work to

- **educate its policy analysts and senior management about sustainable development to ensure that they have sufficient knowledge, capacity, and contacts to consider economic, social, and agri-environmental principles when providing policy, program, or legislative advice;**
- **review departmental policies, programs, and legislation from the perspective of sustainable development and coordinate with other federal departments in integrating sustainable development analysis into policy development; and**
- **produce and publish analyses of key policy options and initiatives, and then review how this information was used to improve the outcomes of sustainable development activities.**

Departmental targets:

4.1.1 On an ongoing basis, AAFC policy analysts and senior management will receive training about sustainable development.

Performance Measure: 1) Yearly number of employees who received training.

4.1.2 By March 31, 2003, there will be a formal process in place to ensure the analysis of policies and programs from the perspective of sustainable development.

Performance Measure: 1) Process developed and implemented.

4.1.3 By March 31, 2004, AAFC will undertake reviews of existing and new policy, programs, and initiatives from the perspective of sustainable development.

Performance Measure: 1) Reports on results of sustainable-development reviews.

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Performance Measure: 1) Reports on results of sustainable-development reviews.

Green procurement at AAFC

AAFC already has some examples of green procurement at work. For example, the department currently stocks a limited amount of certified recycled office products in its store operations. At the Sir John Carling Building in Ottawa (departmental headquarters), a feasibility study is under way to determine the benefits of expanding stocks of green products.

B) Greening departmental operations

Agriculture and Agri-Food Canada owns about 1200 vehicles, 3150 buildings, and 955,000 hectares of land; occupies upwards of 82,500 square metres of office space; and operates research centres, farms, and community pastures. These assets provide ample opportunity to demonstrate green practices in our own operations.

A commitment in our first sustainable development strategy was to begin developing a more systematic approach to environmental management through the implementation of an environmental management system (EMS), based on the ISO 14001 standard. This approach included

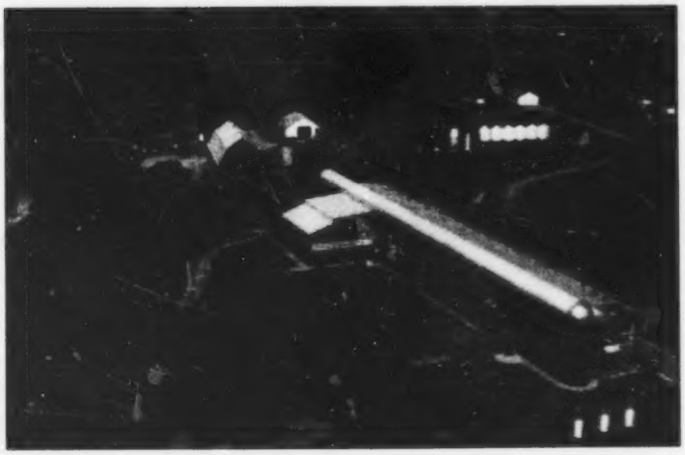
- managing contaminated sites, underground fuel-storage tanks, hazardous-waste storage facilities, and the storage and disposal of PCBs;
- reducing emissions from heating-plant boilers;
- undertaking an environmental management review process; and
- creating and maintaining an intranet Web site for the EMS.

This sustainable development strategy will make further progress in implementing the EMS.

Guided by a recent document *Sustainable Development and Government Operations: A Coordinated Approach*, we have selected six priority areas to green operations

- procurement;
- waste management;
- water conservation;
- energy efficiency;
- vehicle fleet management; and
- departmental risks and liability from land management.

Our sustainable development strategy also reflects the Kyoto Protocol in four of these six priority areas and provides information on how our department will meet its share of the government's commitment to reduce greenhouse gas emissions from its operations.



Objective 4.2:

Practise green procurement

Green procurement is the purchase of environmentally responsible goods and services that reduce resource consumption, waste, greenhouse gas emissions, and risks to the environment and human health.

Our commitment

Agriculture and Agri-Food Canada will

- **incorporate within its own procurement process the following green procurement best-practices advocated by the federal government: evaluating potential purchases against Treasury Board's Materiel Management Environmental Guidelines, providing green procurement training, and purchasing products that meet environmental specifications whenever possible; and**
- **include just-in-time delivery of all standard items on a competitive basis and further reduce the warehousing space required to store these items.**

Departmental targets:

4.2.1 By March 31, 2001, AAFC will identify all personnel requiring green procurement training

Performance Measure: 1) List of persons with purchasing responsibilities.

4.2.2 By March 31, 2002, AAFC will provide green procurement training to all personnel with purchasing responsibility

Performance Measure: 1) Number and proportion of employees with purchasing responsibility who have received green procurement training.

Objective 4.3:

Improve waste management

Waste management is the formal term for reducing, reusing, recycling, and recovering. Its objectives are to reduce the negative impacts of landfill sites, resource consumption, and greenhouse gas emissions. Waste management also aims to cut costs, comply with regulations, and meet public expectations.

Our commitment

Agriculture and Agri-Food Canada, along with other federal departments, will work to adopt a number of best practices to improve waste management. These include

- **using waste-auditing tools and procedures to identify opportunities for waste reduction;**
- **developing and implementing a waste reduction action plan;**
- **instituting separate waste streams at source where such services are operationally and economically available and feasible;**
- **composting organic waste whenever possible; and**
- **encouraging electronic communication, to reduce paper use.**

Departmental targets:

4.3.1 By March 31, 2005, AAFC will conduct waste audits at its major facilities.

Performance Measure: 1) Number of waste management audits performed.

4.3.2 By March 31, 2006 , AAFC will use waste audits to identify opportunities to reduce waste, and will develop and implement waste-reduction plans for each identified facility.

Performance Measure: 1) Number of facilities where waste reduction action plans have been initiated.

Waste management at AAFC

The department has already started on implementing some of these best practices. For example, when Agriculture and Agri-Food Canada launched a recycling program at the Sir John Carling Building during fiscal year 1995/1996, the recycling level was 34 percent of all waste generated. In fiscal year 1998/1999, the level increased to 78 percent. The recycling program has now been expanded in Ottawa to include the Neatby Building on the Central Experimental Farm. This kind of program is a good start and can be emulated at our buildings across the country.

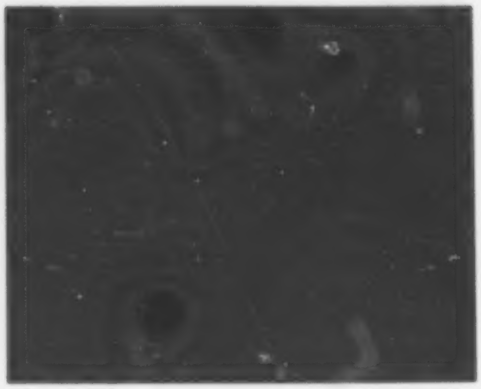
Objective 4.4:

Improve water and wastewater management

Canada is a country rich with water resources — and water users. In fact, Canadians are among the highest users of water in the world. More and more, however, they are realizing the importance of water conservation and are making efforts, both in the home and at the office, to conserve energy, reduce costs, and save the resource.

Water and wastewater management in AAFC

Agriculture and Agri-Food Canada's Lethbridge Research Centre upgraded its irrigation system during fiscal year 1999/2000. By applying water directly over plants and at a very low pressure level, a substantial reduction in evaporation and water loss was achieved.



Our commitment

Agriculture and Agri-Food Canada will incorporate within its own water-management operations the following best practices advocated by the federal government

- **identifying water saving opportunities;**
- **developing and implementing water conservation plans and optimizing water efficiency;**
- **considering water-efficient equipment for future purchases, to reduce water use; and**
- **using grey water for landscaping and irrigation when feasible.**

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Objective 4.5:

Improve building management

Canadians are dependent on energy to power the tasks and functions of daily life. Energy consumption has some detrimental effects on the environment. Efficient energy use can, however, reduce energy consumption and costs, as well as emissions, including those of greenhouse gases.

Our commitment

Agriculture and Agri-Food Canada, along with other federal departments, will work to adopt a number of best practices to improve energy efficiency. These include

- **reviewing energy use;**
- **developing energy management plans;**
- **providing the necessary training in energy efficiency for building operators and managers; and**
- **implementing all economically attractive energy retrofits.**

Building management at AAFC

The following examples illustrate Agriculture and Agri-Food Canada's commitment to more environmentally sustainable building management.

The Atlantic Food and Horticulture Research Centre in Kentville, Nova Scotia, completed a major retrofit to centralize controls of growth and freezer chambers. The installation of a new chiller with a Distributed Control System allows for precision control from a central location and has resulted in a significant reduction in energy consumption.

Under departmental policy, all new boilers are now low nitrous oxides emitting, and we have replaced our largest existing installation with such a unit. Other examples of energy efficiency include the co-gen installation at Vineland, Ontario, an energy retrofit at Harrow, Ontario, and replacement of lighting fixtures at several other AAFC facilities. Similar projects may be possible at other departmental buildings in Canada.

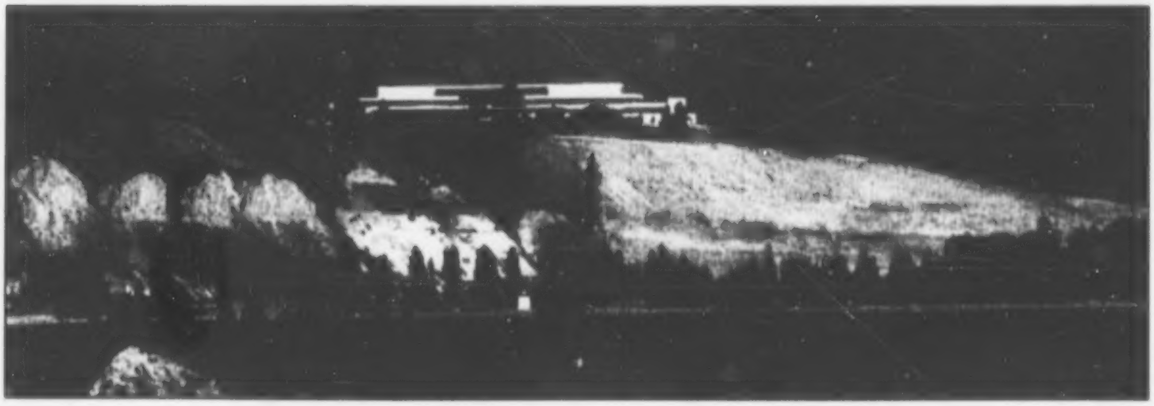
Departmental targets:

4.5.1 By March 31, 2005, AAFC will complete studies to identify cost-effective opportunities to use more efficient and environmentally responsible energy sources for our large and older facilities.

Performance Measure: 1) Number of studies to identify energy-conservation opportunities.

4.5.2 By March 31, 2006, AAFC will implement energy-conservation measures at facilities where it is cost effective.

Performance Measure: 1) Number of energy-conservation measures implemented.



Fleet management at AAFC

AAFC has already started to implement best practices for fleet management. For example, we have purchased alternative-fuel vehicles, thus reducing harmful emissions. We are also making use of dual-fuel vehicles (gasoline — natural gas and gasoline — ethanol) and E-85 vehicles that are capable of operating on blends as high as 85 percent ethanol.

Objective 4.6:

Improve fleet management

Transportation accounts for a significant portion of Canada's greenhouse gas emissions and other air pollutants, including ground-level ozone, nitrous oxide, volatile organic compounds, and fine particulate matter. With 1200 vehicles in our fleet, we contribute to these air-quality problems. By managing our fleet wisely, we can reduce vehicle emissions to meet legislation and policy objectives, including the Kyoto Protocol commitments; cut by-products and waste from vehicle use; and decrease costs.

Our commitment

Agriculture and Agri-Food Canada will continue working to adopt a number of best practices for fleet management. These include

- **managing fleet vehicles in accordance with economic and environmental objectives outlined in Treasury Board's Motor Vehicle Policy;**
- **maximizing fuel efficiency and alternative fuel use;**
- **reducing the number of vehicles and the kilometres traveled for departmental use;**
- **purchasing vehicles of appropriate engine size for intended use; and**
- **testing emissions and maintaining vehicles regularly.**

Departmental target:

4.6.1 AAFC will report annually on progress towards environmentally sustainable fleet management and total fuel consumed.

Performance Measure: Up-to-date 1) road fleet inventory and data on 2) fuel consumption and 3) vehicle type and engine size.

Objective 4.5:

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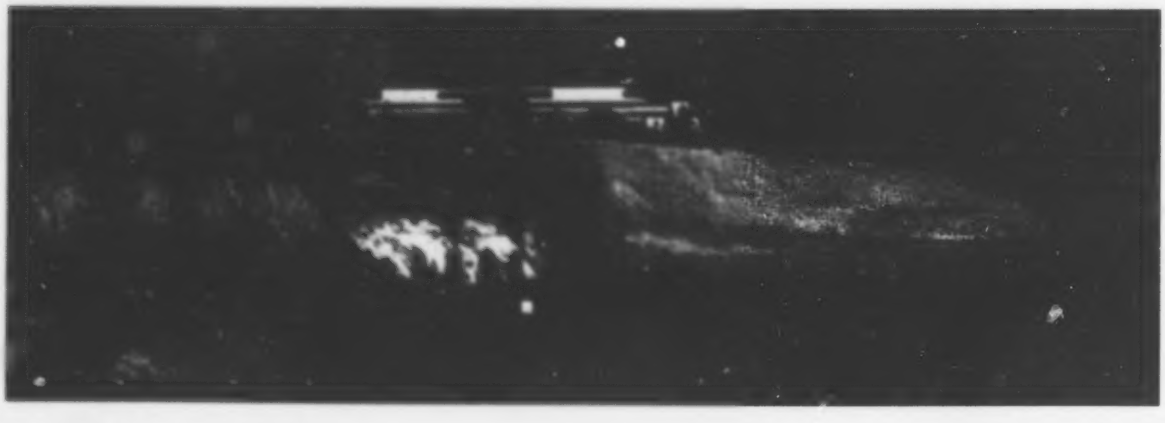
4.5.2 By March 31, 2006, AAFC will implement energy-conservation measures at facilities where it is cost effective.

Performance Measure: 1) Number of energy-conservation measures implemented.



Fleet management at AAFC

AAFC has already started to implement best practices for fleet management. For example, we have purchased alternative-fuel vehicles, thus reducing harmful emissions. We are also making use of dual-fuel vehicles (gasoline — natural gas and gasoline — ethanol) and E-85 vehicles that are capable of operating on blends as high as 85 percent ethanol.

Objective 4.6:

Improve fleet management

Transportation accounts for a significant portion of Canada's greenhouse gas emissions and other air pollutants, including ground-level ozone, nitrous oxide, volatile organic compounds, and fine particulate matter. With 1200 vehicles in our fleet, we contribute to these air-quality problems. By managing our fleet wisely, we can reduce vehicle emissions to meet legislation and policy objectives, including the Kyoto Protocol commitments; cut by-products and waste from vehicle use; and decrease costs.

Our commitment

Agriculture and Agri-Food Canada will continue working to adopt a number of best practices for fleet management. These include

- **managing fleet vehicles in accordance with economic and environmental objectives outlined in Treasury Board's Motor Vehicle Policy;**
- **maximizing fuel efficiency and alternative fuel use;**
- **reducing the number of vehicles and the kilometres traveled for departmental use;**
- **purchasing vehicles of appropriate engine size for intended use; and**
- **testing emissions and maintaining vehicles regularly.**

Departmental target:

4.6.1 AAFC will report annually on progress towards environmentally sustainable fleet management and total fuel consumed.

Performance Measure: Up-to-date 1) road fleet inventory and data on 2) fuel consumption and 3) vehicle type and engine size.

Objective 4.7:

Improve land management

We have significant land holdings across Canada. There are some risks of environmental degradation on this land associated with underground and above-ground storage tanks, contaminated sites, and PCB disposal. We must manage these risks to protect human and environmental health, in accordance with applicable legislation and best management practices. In addition, land-use management places a priority on remediation efforts and steadily reduces the number of properties for which further action is required.

Our commitment

Agriculture and Agri-Food Canada will incorporate within its own land management process the following best practices, advocated by the federal government

- **identifying, classifying, and assessing sites of concern;**
- **managing risks to human health and the environment using risk assessment and techniques for containment, mitigation, and remediation; and**
- **reviewing leasehold agreements between federal and private interests to ensure that they contain appropriate arrangements to prevent contamination.**

Land management at AAFC

Agriculture and Agri-Food Canada has already been at work using best practices for land management.

We have 133 AST-UST (above ground-underground) storage tanks registered. Under our Storage Tank Program, 10 tanks were removed and 41 inspected and upgraded during the 1999-2000 fiscal year. Maintenance procedures have been created and implemented, and we are now focusing on improving these procedures to further reduce the environmental risk of managing our various storage tank systems.

Under our Contaminated Sites Program, all known contaminated sites belonging to AAFC have been assessed, and high-risk sites have either been remediated or are being risk-managed. This fiscal year, as part of Treasury Board's Federal Contaminated Sites Assessment Initiative, the department will determine contingent/liability estimates associated with 37 sites.

Departmental targets:

4.7.1 By March 31, 2002, AAFC will reassess the status of, and action plans for, all contaminated sites, and will identify all liabilities and contingent liabilities associated with them.

Performance Measure: 1) Updated departmental contaminated sites inventory.

4.7.2 By March 31, 2001, AAFC will complete an update of its storage tank management program database for all tanks (above-ground and underground) with respect to tank type, contents, installation date, and location.

Performance Measure: 1) Up-to-date inventory of storage tanks; and 2) Number of action plans for the upgrading of storage tanks.

4.7.3 By March 31, 2002, AAFC will develop and implement environmental emergency response plans for all sites to ensure an effective response capability for the containment, mitigation, and remediation of environmental emergencies.

Performance Measure: 1) Number of environmental incidents reported; and 2) Number of environmental emergency plans.

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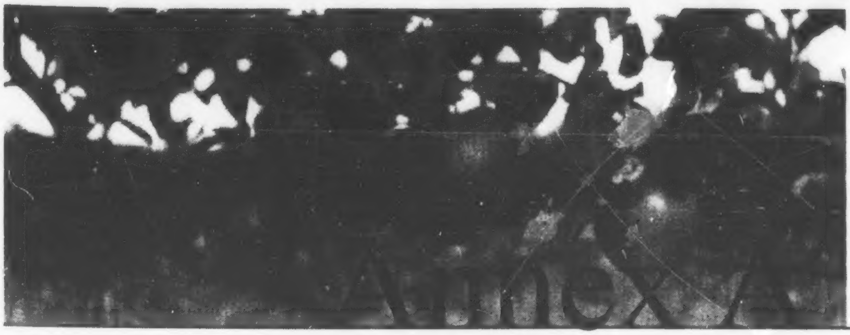


Annex A

AAFC'S First Sustainable Development Strategy

Agriculture and Agri-Food Canada's first sustainable development strategy, *Agriculture in Harmony with Nature: Strategy for Sustainable Agriculture and Agri-food Development*, recognized the efforts of our department and of Canada's agriculture and agri-food sector in promoting sustainable development, and built on their successes in adopting environmentally sustainable practices. As a result of an issue scan, the strategy focused on four key areas

- increasing understanding;
- promoting environmental and resource stewardship;
- developing innovations and solutions; and
- seizing market opportunities.

This annex highlights some of the accomplishments resulting from our first strategy, both within our department and across the sector, and identifies ways to improve upon the first strategy.

Impacts of our first sustainable development strategy

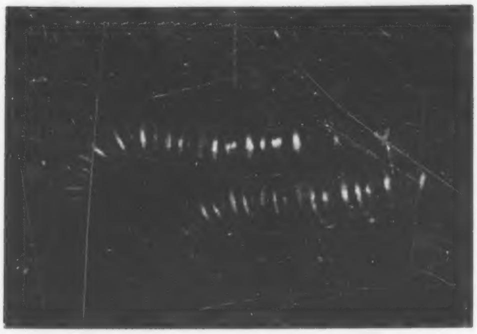
Agriculture and Agri-Food Canada is a natural-resource-based department. As such, many mechanisms to promote environmental sustainability in agriculture have been part of what we do for many years. Our first strategy, which focused on environmental sustainability, helped our department and the sector to formalize the process of integrating environmental thinking into the operations, and to build on the success of existing activities. The strategy was the first attempt to compile a description of our sustainable development activities in one document, and to coordinate those activities at a departmental level. It put structure around what we were already doing and will continue to do.

In addition, the strategy helped us learn more about ourselves and what our colleagues do, and how our own work can contribute to the overall sustainable development goals of the department. It presented a positive image of our department's commitment to the environment and earned it the respect of other departments and stakeholders, which in turn created a positive atmosphere for partnerships and cooperation.

Increasing understanding

Our first sustainable development strategy increased the understanding of sustainable development by providing timely and appropriate information to encourage greater integration of environmental factors into sectoral and departmental decision-making.

We have paid close attention to how we communicate to ensure that the right information gets into the hands of the people who need it. To this end, we have helped fund groups such as the Soil Conservation Council of Canada, which can enlist its network of organizations to take knowledge and concrete solutions to the grassroots. These efforts have gone a long way towards building an understanding of how good land management can benefit not only the global environment, but farm profits as



well. More efficient application of fertilizers, for example, can benefit crop growth while saving money and cutting back on emissions of harmful greenhouse gases, such as nitrous oxide, as well as reducing the risk of water pollution.

To support the federal government's goal of making all its programs accessible to rural Canadians, we have offered more single-window service through our electronic information service, ACEIS (now AAFC Online), and the Canadian Rural Information Service, which relays information on rurally focused subjects such as policies, conferences, and meetings. We have also made improvements to this service by posting new information in a timelier manner and by making it easier for users to find the information they need.

Our first sustainable development strategy recognized the importance of assessing and reporting on the health of our environment as it relates to agriculture. We have improved our ability to do this with the development of 14 agri-environmental indicators that measure, at a national level, key environmental conditions, risks, and changes resulting from agriculture and from management practices of producers. These indicators were published in *Environmental Sustainability of Canadian Agriculture: Report of the Agri-Environmental Indicator Project* (2000). They will also serve as a report card to help the department and industry gauge the effectiveness of conservation programs, and will certainly guide future work. In addition, we published

The Biodiversity Action Plan

Sustainable development within a natural-resource-based sector includes preserving the diversity of organisms and habitat for wildlife. For this reason, our first sustainable development strategy included biodiversity commitments. In February 1998, AAFC released its Biodiversity Action Plan, one of the first federal departments to do so. The plan was accompanied by two related documents, *Biodiversity Initiatives — Agriculture and Agri-Food Canada* and *Biodiversity Initiatives — Canadian Agricultural Producers*, which together provided an inventory of ongoing biodiversity conservation initiatives within the department and the sector. Although there was some overlap between our first sustainable development strategy and the Biodiversity Action Plan, they both successfully increased the awareness and understanding, in both the department and the sector, of the many initiatives carried out by the sector that benefit biodiversity.

The goals of our first Biodiversity Action Plan were to

- promote sustainability in agro-ecosystems while respecting natural ecosystems
- increase awareness and understanding of biodiversity in agriculture
- conserve, and facilitate access to, genetic resources important to agriculture, and share knowledge, expertise, and technologies in a fair and equitable way; and
- integrate biodiversity conservation and sustainable use objectives into departmental policies, programs, strategies, regulations and operations.

In May 1998, the Office of the Auditor General reviewed the department's first Biodiversity Action Plan, commended the department, and suggested the following improvements

- adding time frames, expected results, performance indicators, and the number of resources the department is devoting to biodiversity;
- including more scientific information to support the actions outlined in the plan;
- developing indicators of domesticated diversity; and
- integrating the plan into the plans of other departments and the Canadian Biodiversity Strategy.

In response to these suggestions, we have formulated a new biodiversity strategy and incorporated it entirely in this, our second, sustainable development strategy.

Fostering sustainable rural communities

Through the Rural Dialogue, which began in 1998, rural Canadians have made it clear they are looking for direct involvement in government decisions and programs that affect their quality of life.

The first-ever National Rural Conference, held in April 2000, offered rural Canadians a chance to participate in making decisions about their own future and to exchange information on some of the challenges of life in rural and remote communities, including ensuring a sustainable resource base.

The Health of Our Air (1999) and *The Health of Our Water* (2000), building on the success of *The Health of Our Soils* (1995). Together, these publications illustrate how increased agricultural productivity and taking care of the environment can be compatible objectives. We are also adding depth to our analyses with reports such as *Prairie Agricultural Landscapes: A Land Resource Review* (2000).

We have undertaken a number of initiatives to improve awareness of the importance of pursuing eco-efficient production methods to enhance the environmental sustainability and economic growth prospects of the sector. We have worked with the livestock industry, for example, to develop manure management practices that make sense economically, environmentally, and socially (i.e., by reducing odour) over the long term. The Rural Water Development Program has provided technical information and funding to rural residents in the Prairies to plan and develop reliable water supplies that support economic and environmental sustainability and the overall health of rural Canadians. Departmental environmental programming, such as the National Soil and Water Conservation Program, has included an education and awareness component that we have supported by publishing research studies and discussion papers, and by developing promotional materials, displays, and presentations.

Promoting environmental and resource stewardship

Agriculture and Agri-Food Canada has developed and encouraged the adoption of practices, both within the department and across the sector, that enhance the multiple-use benefits and stewardship of natural resources. As outlined in our first strategy, our role in promoting environmental and resource stewardship is threefold: to work with the sector in broadening the stewardship ethic so that it encompasses off-farm environmental effects; to develop cost-effective tools to help the sector minimize the environmental impacts of its day-to-day business; and to integrate stewardship and pollution prevention into the department's own decision making.

Progress has been made on all three fronts. Our National Soil and Water Conservation Program, a commitment of the first strategy and funded through the Canadian Adaptation and Rural Development Fund, has supported some 300 projects across Canada that have helped the agriculture and agri-food sector in its ongoing efforts to be environmentally sustainable. These projects have included enhancing water quality and conservation, and minimizing the negative effects of agricultural inputs, such as fertilizers and pesticides. In addition, the program has helped farmers reduce their chemical inputs, giving them an economic boost and helping the environment at the same time.

We have made considerable progress on our commitment to help the sector reduce the use of methyl bromide, a fumigant that is a proven threat to the ozone layer. Our department, Environment Canada, and the sector have together led a concerted search for alternatives, exchanged critical information, and transferred technology to the field. To date, Canada has reduced its use of this fumigant by 35 percent.

The food-processing industry faces a number of challenges to reduce environmental impacts. In particular, reducing the amount of packaging sent to landfill sites has been a major issue. We have helped address this issue by working with other federal departments, provinces, and industry to coordinate and promote initiatives to reduce packaging waste from food products. We have also funded related projects and contributed to the activities of the National Task Force on Packaging. To date, we have reduced the amount of raw packaging used (e.g., skids, cardboard boxes), and have had some success in reducing the amount of packaging for consumer products.

Preserving biodiversity is a key activity in sustaining the earth's resources and productivity for the future. Agriculture and Agri-Food Canada was one of the first federal departments to release an action plan for biodiversity (February 1998). Our first sustainable development strategy included a number of commitments that specifically addressed biodiversity, including conserving shelterbelts and community pastures (*see* Box); conserving genetic resources important to agriculture and making them available to the sector; and maintaining and operating crop-specific gene banks for potatoes, cereals, oil seeds, forages, special crops, and hardy ornamentals.

In addition, as part of our agri-environmental indicator project, we included an indicator that established trends on the availability of wildlife habitat on farmland. This initiative was a significant step forward in increasing awareness and understanding of biodiversity in agriculture.

We have promoted sustainability in agro-ecosystems while respecting natural ecosystems. For example, we provided funding for Countryside Canada, a national program established to strengthen conservation practices within the agriculture sector by recognizing and awarding the exemplary stewardship efforts of Canadian farmers and ranchers.

Community pastures in the Prairies

Agriculture and Agri-Food Canada has helped promote the long-term conservation of marginal lands and wildlife areas through its PFRA (Prairie Farm Rehabilitation Administration) community pastures. These PFRA-managed pastures provide grazing and cattle breeding services that have economic benefits for nearby communities and also protect 929,000 hectares of erosion-prone land from cultivation. PFRA has also worked with the Department of National Defence (DND) and Environment Canada to integrate wildlife habitat conservation with cattle grazing on DND land.

In addition, PFRA has supplied trees and shrubs to Prairie producers for shelterbelts, which conserve soil from erosion, provide wildlife habitat, and sequester carbon, thereby helping to reduce greenhouse gases.

(Wildlife Habitat Canada and the Canadian Federation of Agriculture administer this program.)

In 1998, PFRA and Saskatchewan's Ministry of Environment signed a five-year biodiversity conservation partnership agreement that included a commitment to conserve and enhance the health of Saskatchewan's remaining native prairie. This agreement was part of our Biodiversity Action Plan commitment to integrate biodiversity conservation and sustainable use objectives in departmental policies, programs, strategies, regulations, and operations.

Related to our own physical operations, we have addressed a number of environmental issues identified in the federal government's *A Guide to Green Government*. We have established formal programs in a number of priority areas, including contaminated site and fuel storage tank management, as well as storage and disposal policies related to waste management.

We also formalized our departmental environmental management system, which will help us address outstanding environmental issues, such as green procurement, water conservation, wastewater management, and energy efficiency. As part of this effort, we have completed an environmental management review of all our physical operations, generated baseline information, and established site action plans.

Innovative research produces multiple benefits

Agriculture and Agri-Food Canada's reputation for excellence in research is based, in large measure, on the success of its 19 research centres. Each reflects the strengths of the region in which it is located and acts as a nucleus for industry growth.

The Lennoxville Dairy and Swine Research and Development Centre, for example, has developed a more cost-effective and energy-efficient method of heating farrowing barns. Maintaining a farrowing barn at 21°C in the winter is expensive, energy intensive, and unnecessary. By controlling the temperature with heat lamps and giving piglets access to a niche, the ambient temperature may be gradually reduced to 15°C. As a result, piglets make better use of the heated area, the sow's well-being is improved, and energy use and production costs are reduced.

In addition, some Prairie research centres have focused on breeding hardier durum wheat. The economic stakes are high — Canada has a 70-percent share of world trade in durum, worth nearly $1 billion annually to farmers.

These tougher varieties are important to producers, but more resilient crops can also be wind-, drought-, and disease-resistant. These features, in turn, can mean environmental benefits, such as reducing the amount of water needed for irrigation.

Developing innovations and solutions

Agriculture and Agri-Food Canada recognizes that sound science and innovation are key to a strong bottom line for Canada's agriculture and agri-food industry. Innovations also support social well-being by providing a stable, affordable, and safe supply of food to Canadians, as well as job and business opportunities that create stronger communities.

Researchers within the department and across Canada have worked to explore ways of increasing yields from lands currently under production, develop better strains, expand livestock production, and introduce entirely new products and processes, while minimizing the negative environmental effects of agriculture. Under our first sustainable development strategy, collaborative efforts with the private sector have led to several advances that will give Canadian farmers a competitive edge in the marketplace while minimizing impacts on the resource base. For example, many new stress-resistant crops have been certified in the past several years. Some new barley cultivars feature improved resistance to disease, reducing the need for expensive fungicides. As well, new durum wheat cultivars have increased gluten strength, a marketable feature, and use nutrients more efficiently and perform well under minimum tillage regimes designed to reduce erosion and increase productivity. These efforts have gone a long way towards helping us address our pledge to develop new crop varieties that provide environmental benefits.

Nutrient management is an ongoing challenge, and we have worked to address the issue on several fronts, including the development of a manure treatment system that increases the uptake of nitrogen by plants and lowers the risk of phosphorous build-up and nitrogen runoff. In addition to improving fertilizer value, this system allows for the recuperation of biogas (methane), which could be used as an energy source to replace non-renewable energy sources such as propane and natural gas.

We have also continued to work with our provincial and industry colleagues to solve environmental problems and accelerate the adoption of environmental technology through research transfer and collaborative research projects. A case in point is the Hog Environmental Management Strategy (HEMS), which was established through the combined efforts of AAFC and the hog industry (*see* Box on page 56). There are a number of environmental challenges facing livestock producers, ranging from unpleasant odours and air pollution to the degradation of surface water, groundwater, and soil. Our first sustainable development strategy provided a collaborative approach to exploring effective and affordable solutions to address these challenges.

Seizing market opportunities

Our first sustainable development strategy recognized that environmental quality and sustainable growth are key to agri-food marketing and trade. It identified three priority activities for the department in seizing market opportunities: increasing industry awareness of environmental marketing and trade opportunities and constraints; facilitating the demonstration of the environmental quality of products, practices, and services provided by the sector; and influencing domestic and international initiatives in the interests of environmental progress and the sector.

The department has been active on all three priorities, facilitating the diversification and marketing of environmentally beneficial crops, promoting market opportunities related to value-added environmentally sustainable crops, helping negotiate and implement trade agreements, and coordinating strategic approaches to export and investment. As part of this effort, we have taken Canadian producers and their products to eight key world food shows in the past three years. For further accomplishments of these four strategic directions, see our 1997–1998, 1998–1999, 1999–2000 departmental performance reports.

Opportunities for improvement

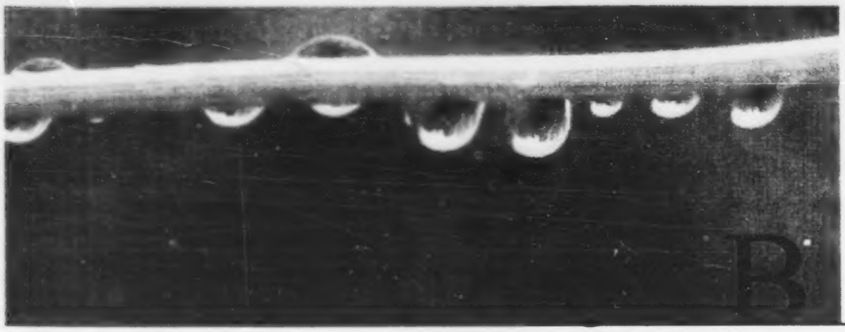
Agriculture and Agri-Food Canada recognizes that working towards the goal of sustainable development is a process of continuous improvement. Our first strategy, *Agriculture in Harmony with Nature*, was a good start, showing us where we were in terms of sustainable development. But it also revealed areas where we needed to improve. In preparing our second strategy, we have addressed those gaps, as well as identified those areas requiring continued work, keeping in mind the observations and recommendations of the Commissioner of the Environment and Sustainable Development.

Supporting the Hog Environmental Management Strategy

AAFC supports a Hog Environmental Management Strategy project to help provincial and municipal land-use planners make environmentally sustainable decisions related to the siting of hog production units and the land application of swine manure. Working with Natural Resources Canada, AAFC researchers developed a standard methodology to assess the suitability of prairie soils for the application of hog manure. Combining the knowledge of experts with data from pedological (soils), hydrological, and geological resource databases, the methodology integrates physical, chemical, and environmental information on soils, land use, and climate with other information on geology and hydrogeology to identify unique soil management groups. Specific management considerations are then related to each of these groups with a view to sustaining or improving soil productivity while minimizing any potential for adverse effects of the manure on the surface water and groundwater environment.

The Commissioner identified two fundamental weaknesses common to the strategies of many departments. The first was the failure to develop clear and measurable targets, which are essential in judging whether strategies are being implemented successfully, or when corrective action is necessary. The second was the failure to specifically identify what policy, program, legislative, regulatory, or operational changes would result from implementing the strategies. In short, many strategies tended to focus more on past accomplishments than on future directions.

The commitments in our first strategy were generally not focused nor easily measured. In this strategy our commitments are more specific and targeted, and they are aligned with and reported on through our business plan process.



Consultations

Sustainable development strategy consultations

Consultations with different levels of government; agricultural, consumer, and environmental organizations; interest groups; industry; and academia were a key component in identifying the strategic directions, objectives, and targets of this strategy. They not only helped in identifying short-term actions, but will also continue to be important in shaping departmental priorities and directions over the longer term and in carrying out the activities needed to achieve a sustainable agriculture and agri-food sector.

Stakeholder involvement enabled us, as a department, to make more informed decisions, ensure greater buy-in, and thus develop a more effective and realistic sustainable development strategy reflecting the interests of Canadians.

Internal consultations

In keeping with the philosophy of continuous improvement, we conducted an assessment of our first sustainable development strategy to help guide the development of this strategy (*see* Annex A). As part of this effort, we held a two-day workshop with departmental employees in early 2000. Workshop participants discussed and evaluated the lessons learned from the first strategy, and used this to help determine the scope and focus of this strategy.

Following this, we established departmental task groups comprising experts in each broad area of the strategy to develop targets and meaningful activities to contribute to the advancement of the objectives in these areas. Based on their reports, a framework for action was developed that formed the basis of our strategy and was used for discussion purposes and to solicit advice from senior management to ensure that the priority areas of action were achievable, realistic, and able to contribute to sustainable development.

External consultations

At the same time, we also met with external stakeholders (*see* list below). As part of joint interdepartmental consultations, for example, AAFC and other federal departments worked with the Canadian Environmental Industries Association to solicit their input and guidance. Discussions centred on the greening of government operations, technology development, eco-efficiency, and international issues, as well as on the scope of issues covered in departmental strategies. We also participated in a joint consultation with Health Canada, Environment Canada, Veterans Affairs Canada, and non-government stakeholders on sustainable development and the health of Canadians.

Comments from a variety of stakeholders were also obtained through our Web site, a broad mail-out, and a number of presentations or meetings with key organizations. We also held a focus group session with traditional and non-traditional stakeholders, at which participants were specifically asked to provide detailed comments and suggestions on our draft sustainable development strategy.

Ongoing consultations

Agriculture and Agri-Food Canada also undertakes regular consultations as part of its day-to-day business. Branches have regular dialogue with an extensive network of clients and partners, through a mix of formal and informal processes at provincial, regional, and local levels. Since many of our activities are related to sustainable development, these consultations allow us to identify emerging needs and changing priorities and to ensure that our programs and policies are relevant and in keeping with our sustainable development objectives.

At the federal level, we work with other natural-resource-based departments (Natural Resources Canada, Environment Canada, Fisheries and Oceans Canada), as well as Health Canada to encourage collaboration and coordination for sustainable development. We also consult with industry, universities, and the provinces on research initiatives to develop products and technologies. This consultation helps to ensure that our work is relevant to the sector and responsive to environmental opportunities and innovations. We also work with industry to develop national research and technology priorities in response to environmental challenges faced by the sector.

The development of international environmental agreements requires consultation on an ongoing basis with departments such as the Department of Foreign Affairs and International Trade and Environment Canada, as well as with the sector, to represent environmental, sectoral, and Canadians interests in the development of international negotiating positions.

The path ahead

We will continue to consult with our employees and stakeholders throughout the life of this sustainable development strategy to solicit input, address evolving challenges facing the sector, and take advantage of new opportunities on the road to sustainable development.

AAFC wishes to thank the many individuals who participated in our consultations:

Agriculture Adaptation Council (D. MacKinnon)

Assembly of First Nations (M. Coon Come)

Aventis CropScience Canada Co. (C. Warfield)

Caledon Institute of Social Policy (K. Battle)

Saskatchewan Council for Community Development (L. Pipke and L. Dmytryshyn)

Canadian Agri-Food Research Council (M. Goss, L. Poste-Flynn)

Canadian Association for Community Care (T. Alexander)

Canadian Cattlemen's Association (P. Strankman)

Canadian Centre for Sustainable Agriculture Inc. (H. Haidn)

Canadian Environment Industry Association (R. Last)

Canadian Environmental Network (C. Bois, D. Daughton, C. Wallis)

Canadian Federation of Agriculture (R. Friesen)

Canadian Horticultural Council (J. Wilson)

Canadian Institute of Child Health (D. Houston, D. Walker)

Canadian Institute for Environmental Law and Policy (A. Mitchell)

Canadian Organic Advisory Board (R. McDonald)

Canadian Paediatric Society (M. A. Davis, P. Munk)

Canadian Pest Control Association (M. Careau)

Canadian Pork Council (E. Aubin)

Carleton University (R. Van Loon)

Christian Farmers Federation of Ontario (J. Beking)

Coalition of National Volunteer Organizations (A. Hutton)

Consumers' Association of Canada (G. Lacombe, D. Croome)

Crop Protection Institute (C. Milne)

Delaney and Associates (R. Delaney)

Ducks Unlimited Canada (D. Chekay)

Eastern Canada Soil and Water Conservation Centre (J. Daigle, G. Fairchild)

Environmental Law Centre (B. Powell)

Heart and Stroke Foundation (W. Tholl)

Heritage Canada Foundation (B. Anthony)

International Institute for Sustainable Development (A. Tyrchniewicz)

Inuit Tapirisat of Canada (J. Kusugak)

Nova Scotia Department of Agriculture and Fisheries (M. Langman)

Newfoundland and Labrador, Department of Forest Resources and Agrifoods (H. Scarth)

Ontario Agri-Food Technologies (G. Surgeoner)

Ontario Corn Producers' Association (K. Hough, T. Daynard)

Ontario Soil and Crop Improvement Association (A. Graham)

Ontario Soybean Growers (R. Petroski)

Pulse Canada (G. Bacon)

Quebec Farmers' Association (H. Maynard)

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (L. Poulin)

Royal Canadian Legion Dominion Command / National Office (B. Barclay)

Saskatchewan Agriculture and Food (W. Gosselin)

Saskatchewan Association of Rural Municipalities (A. Paul)

Soil and Water Conservation Society (J. Bruce)

Soil Conservation Council of Canada (G. Hass)

Union des producteurs agricoles

University of Saskatchewan / College of Engineering (C. Laguë)

Wildlife Habitat Canada (D. Wolthausen)

World Wildlife Fund Canada (R. MacRae)

Sectoral Performance Measures: Baseline Information

Performance measure	Baseline	Year	Coverage	Current trend	References
Strategic Direction 1: Environmental sustainability of our natural resources					
1.1: Improve the health of our soils					
1.1.4 By 2006, there will be an increase in the proportion of Canadian cropland at tolerable risk of water, wind, and tillage erosion					
Proportion of cropland at tolerable risk of water erosion	85%	1996	Canada	Increasing	1
Proportion of cropland at negligible risk of wind erosion	64%	1996	Prairies	Increasing	1
Proportion of cropland at tolerable risk of tillage erosion	46%	1996	Canada	Increasing	1
1.1.5 By 2006, there will be an increase in the proportion of Canada's farmland accumulating soil organic carbon					
Share of Canada's farmland accumulating soil organic carbon	21%	1995	Canada	Increasing	1
1.1.6 By 2006, there will be a decrease in the risk of soil compaction in susceptible areas					
Share of farmland with soils suceptible to compaction under cropping systems that cause compaction	7%	1996	Ontario & Maritimes	Increasing	
Share of farmland with highly compacted soils under cropping systems that reduce soil compaction	9%	1996	Ontario & Maritimes	Decreasing	
1.1.7 By 2006, there will be an increase in the proportion of Prairie cropland at low risk of salinization					
Share of cropland at low risk of soil salinization	56%	1996	Prairies	Stable	1
1.2: Improve the health of our water					
1.2.4 By 2006, there will be an increasing trend in the adoption of best practices for management of farm nutrients					
i Share of cropland area receiving fertilizer by...					
...banding	43%	1995	Canada	NA	1
...injection	22%	1995	Canada	NA	1
ii Share of cropland area receiving fertilizer after planting	10%	1995	Canada	NA	1
iii Share of cropland area for which fertilizer application is reduced to offset nutrient content of manure	24%	1995	Canada	NA	1
iv Share of farmers that conduct soil testing	60%	1995	Canada	NA	1
Share of farmers that test soil every 1-3 years	45%	1995	Canada	NA	1
v Share of animals for which liquid manure is stored using sealed cover tank or tank below slatted floor					
Cattle	24%	1995	Canada	NA	1
Hogs	37%	1995	Canada	NA	1
Hens and chickens	54%	1995	Canada	NA	1

	Performance measure	Baseline	Year	Coverage	Current trend	References
vi	Share of animals for which solid manure is stored using open or covered storage, with containment					
	Cattle	4%	1995	Canada	NA	1
	Hogs	12%	1995	Canada	NA	1
	Hens and chickens	9%	1995	Canada	NA	1
vii	Share of animals on farms with more than 200 days of liquid manure storage capacity					
	Cattle	43%	1995	Canada	NA	1
	Hogs	50%	1995	Canada	NA	1
	Hens and chickens	31%	1995	Canada	NA	1
viii	Share of cropland area with injected liquid manure	<1	1995	Canada	NA	1
ix	Share of manure that is applied during summer	19%	1995	Canada	NA	1
1.2.5	By 2006, there will be a decrease in the proportion of farmland at intermidiate and high risk of water contamination by nitrogen and phosphorus in susceptible areas					
	Share of farmland at low risk of N water contamination	47%	1996	BC/On/ Que/Atl	Increase	1
	Share of farmland at low risk of P water contamination	19%	1996	Quebec	Stable	1
1.2.6	By 2006, there will be an increasing trend in the adoption of best practices for irrigation and for water use by farms and food-processing facilities					
	Performance measure to be developed					
1.3: Improve the health of our air						
1.3.4	By 2006, there will be a decrease in greenhouse gas emissions by agriculture, and an increase in the proportion of Canada's farmland accumulating soil organic carbon					
	Agricultural emissions of greenhouse gases (nitrous oxide, methane, carbon dioxide), without emissions from on-farm fossil use and indirect sources	50Mt (CO2eq)	1996	Canada	Decease	1
	Share of Canada's farmland accumulating soil organic carbon	21%	1995	Canada	Increasing	1
1.3.5	By 2003, there will be a 70% reduction in the consumption of methyl bromide by the agriculture and agri-food sector					
	Methyl bromide quotas (actual use)	200 T	1991	Canada	Decreasing	2
1.3.6	By 2006, there will be an increasing trend in the adoption by producers of best management agricultural practices or technologies that reduce emissions of odours and particulate matter					
	Performance measure to be developed					
1.4: Improve agricultural biodiversity						
1.4.3	By 2010, there will be an increase in knowledge and understanding of the sector with regard to agricultural biodiversity and the importance of conserving it					
	Performance measure to be developed					
1.4.4	By 2010, there will be an improvement in the conservation, sustainable use, and enhancement of agricultural biodiversity					
	Performance measure to be developed. AAFC is addressing this gap by working, in collaboration with Organization for Economic Co-operation and Development (OECD) countries, to develop indicators of agricultural diversity at the international level This approach is appropriate, as most of the agricultural biodiversity available as a resource for use in Canada is widely dispersed throughout the world					
1.5: Improve the conservation of natural biodiversity						
1.5.5	By 2006, there will be an increase in knowledge and awareness of natural biodiversity and in stewardship initiatives carried out by farmers and ranchers that benefit natural biodiversity					
	Follow-up survey of farmers and ranchers indicates a measured increase in knowledge, awareness and stewardship initiatives carried out	Survey	2000	Canada	–	3

	Performance measure	Baseline	Year	Coverage	Current trend	References
1.5.6	By 2006, there will be an neutral or positive trend in habitat availability on agricultural land across Canada					
	Share habitat use units associated with agricultural land for which habitat area increased or remained constant					
	Pacific Maritime	24%	81–96	Ecozone PM	–	1
	Montane Cordillera	96%	81–96	Ecozone MC	–	1
	Boreal Plains	99%	81–96	Ecozone BP	–	1
	Prairies	99%	81–96	Ecozone Pr	–	1
	Boreal Shield	75%	81–96	Ecozone BS	–	1
	Mixedwood Plains	25%	81–96	Ecozone MP	–	1
	Atlantic Maritime	85%	81–96	Ecozone AM	–	1

Strategic Direction 2:

Prosperous and viable sector in a sustainable manner

2.1: Improve productivity through eco-efficiency

2.1.4	By 2006, there will be an increase in the ratio of agricultural output energy over input energy					
	Energy output / Energy input	1.8	1996	Canada	Increasing	1
	Chemical use intensity *(to be developed)*					
2.1.5	By 2006, the Canadian primary agriculture sector will demonstrate productivity growth that equals or exceeds those of other key producing nations or regions with temperate climates					
	Annual Multi-country productivity measurement	–	–	–	–	–

2.2: Improve market development for sustainable food and non-food products, technologies and knowledge

2.2.5	By 2005, there will be an increase in the Canadian share of the world's agriculture and agri-food trade to 4%, and of the contribution of value-added exports to 60%					
	Canadian share of the world's agriculture and agri-food trade	2%	1995	Canada	–	–
	Contribution of value-added exports	40%	1995	Canada	–	–
2.2.6	By 2004, there will be an increase in investment in post-farmgate					
	Performance measure to be developed					

Strategic Direction 3:

Contribution to sustainable communities

3.1: Risk reduction in pest management

3.1.4	By 2006, there will be an increasing trend in the adoption by producers of integrated pest management and of best management agricultural practices or technologies that reduce risk associated with pest management					
i	Proportion of crop area receiving herbicide for which the decision tool used to decide timing of herbicide application is "economic injury level"	20%	1995	Canada	NA	1
ii	Proportion of crop area receiving pesticides for which the decision tool used to decide timing of insecticide and fungicide application is "economic injury level"	25%	1995	Canada	NA	1
iii	Proportion of crop area receiving pesticide for which sprayer is calibrated between different pesticides	16%	1995	Canada	NA	1
iv	Proportion of crop area for which no alternative to chemical controls are used	33%	1995	Canada	NA	1

Performance measure	Baseline	Year	Coverage	Current trend	References
3.2: Informed public dialogue on agri-environmental issues					
3.2.4 The frequency and significance of agriculture-related environmental issues will diminish					
Yearly report from media scanning and public opinion surveys.	–	–	–	–	–
3.3: Healthy innovative products					
3.3.5 By 2006, there will be significant increases in investment in the functional food/nutraceutical sector in Canada, and in Canada's share of global markets					
Number and magnitude of new investments in the functional food/nutraceutical industry	–	–	–	–	–
Canada's share of global markets	–	–	–	–	–
3.3.6 By 2006, there will be an increase in how well-informed the public and agri-food community are about the potential for functional foods/nutraceuticals to improve health and contribute to a dynamic economy.					
Consumer and health-professional surveys	–	–	–	–	–
Value-chain success stories	–	–	–	–	–

NA = Not available

References (see Annex D):

1 Environmental Sustainability of Canadian Agriculture: Report of the Agri-Environmental Indicator Project.

2 Data Report: Production and Consumption of Ozone Depleting Substances 1986 – 1998.

In this report, methyl bromide is measured in tons of Ozone Depleting Potential (ODP). It is equivalent to the Metric tonnes of methyl bromide consumed x an ODP factor (0.6 for methyl bromide).

3 Survey of Farmers, Ranchers, and Rural Landowners: Attitudes and behaviours regarding land stewardship, 2000.

Annex D

Further Reading

1998–1999 AAFC Departmental Performance Report
    www.agr.ca/rpp/dpre.html

1999 Report of the Commissioner of the Environment and Sustainable Development
    www.oag-bvg.gc.ca/domino/reports.nsf/html/c9menu_e.html

Auditor General Act
    www.oag-bvg.gc.ca/domino/reports.nsf/html/95menu_e.html

Biodiversity in Agriculture – AAFC's first Action Plan
    http://www.agr.ca/policy/environment/eb/public_html/pdfs/biodiversity/action_plan.pdf

Two accompanying documents:

- Biodiversity Initiatives – Agriculture and Agri-Food Canada
  www.agr.ca/policy/environment/eb/public_html/pdfs/biodiversity/bioinit_aafc.pdf
- Biodiversity Initiatives – Canadian Agricultural Producers
  www.agr.ca/policy/environment/eb/public_html/pdfs/biodiversity/bioinit_cap.pdf

Canadian Environmental Assessment Act
    www.ceaa.gc.ca/act/act_e.htm

Canadian Environmental Protection Act
    www.ec.gc.ca/cepa/

Cartagena Protocol on Biosafety to the Convention on Biological Diversity
    www.biodiv.org/biosafe/protocol/Protocol.html

Census of Agriculture – Canada
    www.statcan.ca/english/censusag/agri.htm

Cultivating a Secure Future: Rural Development and Sustainable Agriculture in Canada
    www.ec.gc.ca/agenda21/2000/agriculteng.htm

Data Report: Production and Consumption of Ozone Depleting Substances 1986–1998
    http://www.unep.org/ozone/DataReport99.shtml

Environmental Sustainability of Canadian Agriculture: Report of the Agri-Environmental Indicator Project
    www.agr.ca/policy/environment/eb/public_html/ebe/sum_aei.html

Federal Framework for Action in Rural Canada
    www.rural.gc.ca/framework_e.html

Fisheries Act
    canada.justice.gc.ca/en/laws/F-14/index.html

Guidelines for Canadian Drinking Water Quality
    www.hc-sc.gc.ca/ehp/ehd/catalogue/bch_pubs/dwgsup_doc/dwgsup_doc.htm

The Health of Our Air, Agriculture and Agri-Food Canada
    res2.agr.ca/research-recherche/science/Healthy_Air/toc.html

The Health of Our Soils, Agriculture and Agri-Food Canada
    sis.agr.ca/CANSIS/PUBLICATIONS/HEALTH/index.html

The Health of Our Water, Agriculture and Agri-Food Canada
res2.agr.ca/research-recherche/science/Healthy_Water/toc.html

Kyoto Protocol to the Convention to the United Nations Framework Convention on Climate Change
www.unfccc.de/resource/docs/convkp/kpeng.html

The Montreal Protocol on Substances that Deplete the Ozone Layer
www.unep.org/ozone/montreal.htm

National Rural Conference (Report)
www.rural.gc.ca/conference/report_e.html

The North American Agreement on Environmental Cooperation
www.cec.org/pubs_info_resources/law_treat_agree/naaec/index.cfm?varlan=english

The North American Waterfowl Management Plan
www.nawmp.ca/

Pesticides: Making the right choice for the protection of health and the environment. Report of the Standing Committee on Environment and Sustainable Development, May 2000
www.parl.gc.ca/InfoComDoc/36/2/ENVI/Studies/Reports/envi01-e.html

Pest Control Products Act
canada.justice.gc.ca/en/laws/P-9/index.html

Prairie Agricultural Landscapes: A Land Resource Review
www.agr.ca/pfra/pub/pallande.htm

Restoration of the American Chestnut - Farm Response to a Species at Risk
www.ontariosoilcrop.org/AmericanChestnut.htm

Survey of Farmers, Ranchers and Rural Landowners – Attitudes and behaviours regarding land stewardship
www.whc.org/publication/24-10-00-e.htm

Toxic Substance Management Policy
www.ec.gc.ca/toxics/toxic1_e.html

U.N. Convention on Biological Diversity
www.unep.ch/bio/conv-e.html

UN Framework Convention on Climate Change
www.unfccc.de/resource/conv/index.html

The UNECE Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone
www.unece.org/env/lrtap/welcome.html

The UNECE Protocol on Persistent Organic Pollutants (POPs)
www.unece.org/env/lrtap/protocol/98pop.htm

Agriculture in harmony with nature II

Agriculture and Agri-Food Canada's Sustainable Development Strategy — 2001–2004

Strategic Direction 1

Environmental sustainability of our natural resources

A) Natural resources

Objective 1.1:

Improve the health of our soils

Departmental targets:

1.1.1 On an ongoing basis, AAFC will undertake or fund research projects related to soil conservation to increase the understanding of factors affecting soil health.

1.1.2 On an ongoing basis, AAFC will undertake or fund initiatives, including education and awareness activities, to increase the adoption by producers of best practices or technologies that conserve or improve soil resources.

1.1.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options that could enhance the sector's capacity to manage soil resources.

Agri-environmental targets:

1.1.4 By 2006, there will be an increase in the proportion of Canadian cropland at tolerable risk of water, wind, and tillage erosion.

1.1.5 By 2006, there will be an increase in the proportion of Canada's farmland accumulating soil organic carbon.

1.1.6 By 2006, there will be a decrease in the risk of soil compaction in susceptible areas.

1.1.7 By 2006, there will be an increase in the proportion of Prairie cropland at low risk of salinization.

Objective 1.2:

Improve the health of our water

Departmental targets:

1.2.1 On an ongoing basis, AAFC will undertake or fund research projects related to water quality, sustainable nutrient management, and sustainable irrigation, to increase the understanding of factors affecting water quality and availability.

1.2.2 On an ongoing basis, AAFC will undertake or fund initiatives, including education and awareness activities, to increase the adoption by producers of best practices or technologies that conserve the water resource.

1.2.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options that could enhance the sector's capacity to manage water resources.

Agri-environmental targets:

1.2.4 By 2006, there will be an increasing trend in the adoption of best practices for nutrient management.

1.2.5 By 2006, there will be a decrease in the proportion of farmland at intermediate and high risk of water contamination by nitrogen and phosphorus in susceptible areas.

1.2.6 By 2006, there will be an increasing trend in the adoption of best practices for water use by farms and food-processing facilities.

Objective 1.3:

Improve the health of our air

Departmental targets:

1.3.1 On an ongoing basis, AAFC will undertake or fund research projects related to air quality, the ozone layer, and climate change to increase the understanding of factors affecting air quality, climate change, and their impact on agriculture.

1.3.2 On an ongoing basis, AAFC will undertake or fund education and awareness initiatives to increase the adoption by producers of best practices or technologies that mitigate poor air quality, ozone depletion, or the agriculture's impact on climate change.

1.3.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options that could enhance the sector's capacity to mitigate their impact on air quality.

Agri-environmental targets:

1.3.4 By 2006, there will be a decrease in greenhouse gas emissions by agriculture, and an increase in the proportion of Canada's farmland accumulating soil organic carbon.

1.3.5 By 2003, there will be a 70-percent reduction in the consumption of methyl bromide by the agriculture and agri-food sector.

1.3.6 By 2006, there will be an increasing trend in the adoption by producers of best management agricultural practices or technologies that reduce emissions of odours and particulate matter.

B) Biodiversity

Objective 1.4:

Improve agricultural biodiversity

Departmental targets:

1.4.1 On an ongoing basis, AAFC will undertake or fund collaborative research projects to increase the state of knowledge of agricultural biodiversity in Canada; to develop new crops or crop germplasm, or new uses for traditional crops; and to examine possible impacts on agro-ecosystems of plants with new traits.

1.4.2 On a regular basis, AAFC will undertake or fund communication initiatives to increase the sector's awareness of the status and importance of agricultural biodiversity in Canada.

Agri-environmental targets:

1.4.3 By 2010, there will be an increase in the sector's knowledge and understanding of biodiversity and the importance of conserving it.

1.4.4 By 2010, there will be an improvement in the conservation, sustainable use, and enhancement of agricultural biodiversity.

Objective 1.5:

Improve the conservation of natural biodiversity

Departmental targets:

1.5.1 On an ongoing basis, AAFC will undertake or fund collaborative research projects to increase the knowledge and understanding of natural biodiversity, and the importance of conserving it.

1.5.2 Starting in 2001, AAFC will provide leadership for the development, in collaboration with partners, of an electronically accessible national database network of biodiversity information.

1.5.3 On an ongoing basis, AAFC will undertake or fund education and awareness initiatives to communicate the importance of natural biodiversity. It will also recognize and award farmers' and ranchers' exemplary stewardship practices that benefit natural biodiversity.

1.5.4 On an ongoing basis, AAFC will contribute to biodiversity conservation and enhancement on lands it administers.

Agri-environmental targets:

1.5.5 By 2006, there will be an increase in farmers' and ranchers' knowledge and awareness of natural biodiversity and in the stewardship initiatives they carry out that benefit natural biodiversity.

1.5.6 By 2006, there will be a neutral or positive trend in habitat availability on agricultural lands across Canada.

Strategic Direction 2

Prosperous and viable sector in a sustainable manner

Objective 2.1:

Improve productivity through eco-efficiency

Departmental targets:

2.1.1 On an ongoing basis, AAFC will undertake or fund research projects aimed at increasing input efficiency in the agriculture and agri-food sector.

2.1.2 By March 31, 2004, AAFC will have completed or funded at least three education and awareness initiatives aimed at increasing the agriculture and agri-food sector's understanding of eco-efficient practices.

2.1.3 On an ongoing basis, AAFC will identify, analyze, evaluate, and implement policy options to further the understanding and adoption of eco-efficient production and processing practices.

Agri-economic targets:

2.1.4 By 2006, there will be an increase in the ratio of agricultural output energy over input energy.

2.1.5 By 2006, the Canadian primary agriculture sector will demonstrate growth in productivity that equals or exceeds that of other key producing nations or regions with temperate climates.

Objective 2.2:

Improve investment, market access, and market development for agriculture and agri-food products, technologies, and knowledge that contribute to sustainable agriculture

Departmental targets:

2.2.1 On an ongoing basis, AAFC will prepare and disseminate information materials on identified international market opportunities for Canadian food and non-food products, practices, and technologies that contribute to sustainable agriculture.

2.2.2 Starting in 2001, AAFC will undertake at least one national and one international promotion initiative each year related to sustainable Canadian food and non-food products, technologies, and/or knowledge.

2.2.3 On an ongoing basis, AAFC will maintain and improve market access for Canadian agriculture and agri-food products.

2.2.4 On an ongoing basis, AAFC will promote awareness of, as well as retain and attract increased investment in, the life science sector, including new environmentally sustainable technologies, products, and processes.

Agri-economic targets:

2.2.5 By 2005, there will be an increase in the Canadian share of the world's agriculture and agri-food trade to four percent, and of the contribution of Canadian value-added exports to 60 percent.

2.2.6 By 2004, there will be an increase in investment in value-added agricultural products.

Strategic Direction 3

Contribution to sustainable communities

Objective 3.1:

Reduce risk in pest management

Departmental targets:

3.1.1 On an ongoing basis, AAFC will undertake or fund research projects related to integrated pest management to further the understanding of ways to reduce our reliance on pesticides.

3.1.2 On an ongoing basis, AAFC will undertake or fund education and awareness initiatives to increase the adoption by the sector of integrated pesticide management and best practices related to pesticide use.

3.1.3 On an ongoing basis, AAFC will play an active policy role with partners to facilitate the introduction, and improve the availability, of reduced-risk pest-control products to the sector.

Agri-social targets:

3.1.4 By 2006, there will be an increasing trend in the adoption by producers of integrated pest management and of best management agricultural practices or technologies that reduce the risk associated with pest management.

Objective 3.2:

Encourage informed public dialogue on agri-environmental issues

Departmental targets:

3.2.1 On an ongoing basis, AAFC will develop and produce information and tools for communities, the sector, or the public, so they can make informed land-management decisions that may affect the sustainability of natural resources.

3.2.2 On a regular basis, AAFC will report on agriculture's progress towards improving environmental performance, and will identify areas that remain at risk.

3.2.3 On an ongoing basis, AAFC will communicate or consult with Canadians to better inform them on the production of Canadian food and to identify and address their concerns related to intensive agricultural production.

Agri-social targets:

3.2.4 The frequency and significance of agriculture-related environmental issues will diminish.

Objective 3.3:

Develop healthy innovative products

Departmental targets:

3.3.1 AAFC will undertake and/or support collaborative research that supports crop and product development and health claims, and enables technology transfer and scale-up leading to commercial products.

3.3.2 AAFC will undertake and/or support initiatives to facilitate development of regulations conducive to growth and competitiveness in the functional food/nutraceutical sector.

3.3.3 AAFC will undertake and/or support initiatives to facilitate domestic and foreign investment in the functional food/nutraceutical sector, and in Canada's share of global markets for these products.

3.3.4 AAFC will undertake and/or support initiatives to raise Canadians' awareness of the potential for functional foods/nutraceuticals to improve health, and of the role of public research and technologies; and producers' awareness of market opportunities and tools to take advantage of them.

Agri-economic and agri-social targets:

3.3.5 By 2006, there will be significant increases in investment in the functional food/nutraceutical sector in Canada, and in Canada's share of global markets.

3.3.6 By 2006, there will be an increase in how well-informed the public and agri-food community are about the potential for functional foods/nutraceuticals to improve health and contribute to a dynamic economy.

Strategic Direction 4

Sustainable development integrated into departmental policies, programs, and operations

A) Sustainable development in policies and programs

Objective 4.1:

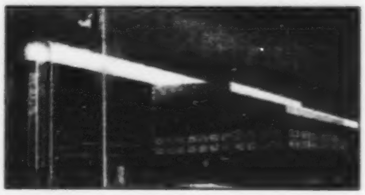
Integrate sustainable development principles into policy and program development

Departmental targets:

4.1.1 On an ongoing basis, AAFC policy analysts and senior management will receive training about sustainable development.

4.1.2 By March 31, 2003, there will be a formal process in place to ensure the analysis of policies and programs from the perspective of sustainable development.

4.1.3 By March 31, 2004, AAFC will undertake reviews of existing and new policy, programs, and initiatives from the perspective of sustainable development.



B) Greening departmental operations

Objective 4.2:

Practise green procurement

Departmental targets:

4.2.1 By March 31, 2001, AAFC will identify all personnel requiring green procurement training.

4.2.2 By March 31, 2002, AAFC will provide green procurement training to all personnel with purchasing responsibility.

Objective 4.3:

Improve waste management

Departmental targets:

4.3.1 By March 31, 2005, AAFC will conduct waste audits at its major facilities.

4.3.2 By March 31, 2006 , AAFC will use waste audits to identify opportunities to reduce waste, and will develop and implement waste-reduction plans for each identified facility.

Objective 4.4:

Improve water and wastewater management

Departmental targets:

4.4.1 By March 31, 2005, AAFC will conduct water and wastewater audits at its major facilities.

4.4.2 By March 31, 2006, AAFC will develop and implement water and wastewater reduction plans for each identified facility.

Objective 4.5:

Improve building management

Departmental targets:

4.5.1 By March 31, 2005, AAFC will complete studies to identify cost-effective opportunities to use more efficient and environmentally responsible energy sources for our large and older facilities.

4.5.2 By March 31, 2006, AAFC will implement energy-conservation measures at facilities where it is cost effective.

Objective 4.6:

Improve fleet management

Departmental target:

4.6.1 AAFC will report annually on progress towards environmentally sustainable fleet management and total fuel consumed.

Objective 4.7:

Improve land management

Departmental targets:

4.7.1 By March 31, 2002, AAFC will reassess the status of, and action plans for, all contaminated sites, and will identify all liabilities and contingent liabilities associated with them.

4.7.2 By March 31, 2001, AAFC will complete an update of its storage tank management program database for all tanks (above-ground and underground) with respect to tank type, contents, installation date, and location.

4.7.3 By March 31, 2002, AAFC will develop and implement environmental emergency response plans for all sites to ensure an effective response capability for the containment, mitigation, and remediation of environmental emergencies.